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ABSTRACT

To examine what changes occurred in the acute health care delivery systems of rural Texas energy impact communities from 1978 to 1983, a retrospective survey was used to acquire data from which a database could be generated that could provide information for community and state policy decisions. From a pool of communities chosen by a panel of experts, five communities were selected for study. Three survey tools were used to collect data about health manpower resources, operational status, physical infrastructures, and health care clients. Two interview questionnaires for agency representatives and community residents were also utilized. Using descriptive statistics methods for data analysis disclosed that during impact and/or post-impact periods manpower increased, costs rose, services became more varied, and building expansion occurred. Overall, there were more problems in the acute health care delivery system during the impact and post-impact than during pre-impact, causing agencies to expand and upgrade much sooner than they would have if the communities had remained pre-impact. Regardless of the problems associated with energy impact, acute health care delivery systems improved. Graphic and tabular information is presented in the data analysis section and conclusions are broken down into specific subheadings reflecting impact period, problems, and changes. (PM)

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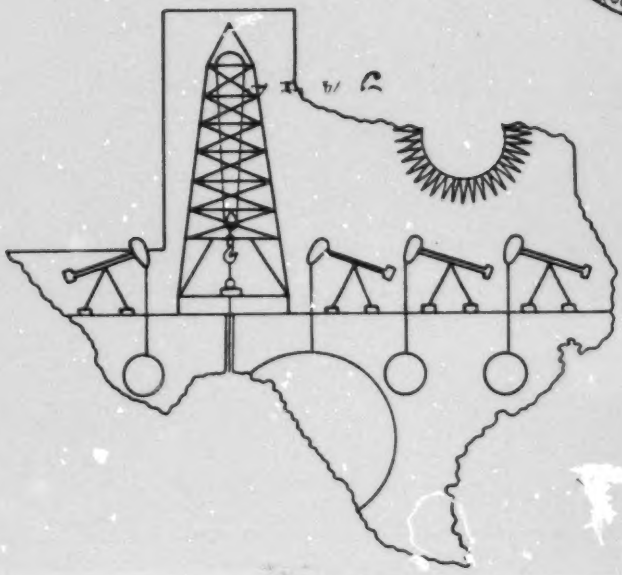

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ACUTE HEALTH DELIVERY, ENERGY IMPACT, AND RURAL TEXAS

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CHAPTER I

INTRODUCTION

Throughout the uncertainty surrounding each stage of energy impact, the acute health care delivery systems of rural communities must provide health care services. Often, the acute health care delivery systems, represented by the hospitals, health care provider offices, and emergency medical services, within rural communities are unsophisticated and struggling to provide minimal services to community residents. When rural communities become the scene of oil and gas exploration, development and production, this system is expected to respond to health care needs generated by population and industrial growth. The acute health care delivery system must also react when declining population and industrial levels accompany reduced oil and gas exploration, development and production.

Although the acute health care delivery system is an essential component of any rural community, few studies have examined what changes occur in this system during the stages of the energy impact cycle, i.e., pre-impact, impact, and post-impact. This scarcity of research has prompted both rural health care (Rogers 1982; Rowley 1983) and energy impact (Burke 1976; Freudenburg 1981, 1983; Moen 1980; Root 1979) investigators to recommend studies that examine the "rural health care delivery system's responsiveness to the boom/bust cycle (or energy impact cycle) of energy development towns" (Rowley 1983).

Studies focusing on the health care delivery system during various stages of the oil and gas impact cycle have both historic and futuristic significance. Since the mid-nineteenth century discovery of oil and gas on American lands, the nation has experienced numerous occurrences of the energy impact cycle. A chief characteristic of the oil and gas industry is its propensity to pass through periods of no activity, accelerated activity, and then decelerated activity. The community's population and industrial level correspond with each fluctuation in oil and gas activity. During periods of intense oil and gas exploration, development, and production, it is not unusual for a rural community to double its size almost overnight. Once these oil and gas activities decline, the rural community can disappear nearly as quickly (Kassover and McKeown 1981). For the past fifty years, such a cycle has transpired nearly every decade (Sanderson-Stinson 1977; "West Texas..." 1984).

The most recent oil and gas impact of rural communities began in the early seventies. Prior to that time, it was cheaper to import crude oil for one dollar a barrel than to produce it domestically for three dollars a barrel. The economics of oil and gas exploration, development, and production in America dictated drilling only low cost wells in high yielding fields. As a result, approximately 36 percent of all oil consumed by Americans was imported. Nearly half of that oil was imported from the Middle East ("Analysis..." 1984; "Petroleum Update" 1983; Shontz 1980).

In 1973, the luxury of abundant, cheap oil supplies changed suddenly when high-producing oil countries, predominately from the Middle East, organized an oil cartel called the Organization of Petroleum Exporting Countries (OPEC). In response to the U.S. support of Israel in the Yom Kippur War, OPEC nations called an oil embargo against the U.S. Only then did a majority of Americans realize that their way of life depended on a reliable and adequate supply of energy. Americans also became acutely aware of (1) the nation's half-hearted attempt to explore, develop, and produce domestic oil supplies, (2) the nation's increasing dependence upon foreign oil sources, and (3) the nation's ever-growing consumption of all energy products, especially oil. When the five month boycott ended, oil prices began "a dizzying dance upward" (Reische 1975). The nation's costs for imported oil increased from $3.9 billion in 1973 to $24 billion in 1974. The price per barrel of oil temporarily stabilized at $10 per barrel (The World Bank 1983). In 1979, a second energy crisis, brought on by the Iranian revolution, raised oil prices to $13.34 per barrel and finally up to a peak of $34 per barrel by 1982.

The onset of these rising oil prices caused the U.S. to embark upon an energy self-sufficiency program. Major attempts were exerted to develop renewable energy sources such as nuclear power and solar energy, to produce oil substitutes from oil shale and coal gasification, to practice energy conservation and to explore, develop and produce domestic oil products ("If U.S. Faced..." 1983; Monts and Bareiss 1979; Organisation for Economic Co-Operation and Development 1981).

Other incentives to increase oil and gas exploration occurred between the late seventies and 1981. At that time, a phaseout of domestic oil price controls caused petroleum company profits to soar. Corresponding with the petroleum companies' widening profit margins were generous tax shelter incentives. Almost immediately, energy companies intensified their search for new oil and

gas fields (Southern States Energy Board 1981). Although 1982 statistics reveal intense oil and gas exploration, a sudden slowdown in these activities precipitated the post-impact stage of the energy impact cycle. During the first quarter of 1982 and extending into mid-1983, the nation's oil and gas industries entered their "deepest slump in history" ("OGJ..." 1984). Causes for this decline in oil and gas activities centered around such things as the nation's economy, unseasonably cold weather, the end of generous tax shelter incentives for energy companies, and a worldwide oil glut ("Oil Slowdown..." 1982; "Outlook..." 1982; "West Texas..." 1984). About mid-1983, oil and gas activities increased slightly and then stabilized. This period of stabilization indicated a continuation of the post-impact stage.

Looking into the future, it is uncertain how long this post-impact stage will continue. As the nation perseveres towards energy self-sufficiency, the demand for oil continues to exceed current domestic production levels. During 1984, the nation's economic growth combined with deteriorating conservation practices contributed to America's having the highest oil usage in six years and to a worldwide need for an additional one billion barrels of oil per day ("Boom and Bust..." 1984; "Oil Demand..." 1983; "Oil Exports..." 1984; "Oil Usage..." 1985). In spite of other energy alternatives and the fluctuating, but high, price of oil, 50 percent of all energy consumed by Americans still comes from oil. Statistics from 1984 show that the U.S. imported 33 percent of the oil it consumed. Conflicting reports indicate that from 8 to 19 percent of all imported oil came from the highly volatile Middle East. In the future, even slight disturbances in the Middle East could threaten continued U.S. imports of oil from OPEC ("Analysis..." 1984; "If U.S. Faced..." 1983; "Oil Imports..." 1985; "Persian Gulf..." 1985; "U.S. Crude..." 1984).

Nationally, other situations might also stimulate future oil and gas activities. Attempts to substitute renewable energy sources, such as solar and nuclear power, for oil and gas products have been delayed because of financial difficulties, public opposition, insufficient research and development, and legal requirements. Likewise, programs to develop oil substitutes have floundered because of economic and legal constraints ("Analysis..." 1984; Exxon Corporation 1980; "If U.S. Faced..." 1983). Complicating the nation's energy supply are declining oil production levels resulting from maturing oil fields, difficulty in locating new fields in frontier and off-shore areas, and the premature loss of marginal wells due to economic factors (Southern States

Energy Board 1981). By the year 2000, more than three-fourths of the domestic crude oil needed by the U.S. will have to come from either fields not discovered or imports ("If U.S. Faced..." 1983; "Oil Exports..." 1984; "U.S. Needs to Tax..." 1982).

Although both present and future situations seem to support an increased need for oil and gas exploration, development, and production, only time will tell when the nation will advance from the post-impact stage to the other stages within the energy impact cycle. Since the stages are cyclical, it is inevitable that a transition to the other stages will occur.

The acute health care delivery system's ability to pass through these stages is significant to the many rural communities that could be energy impact communities. Recent studies indicate that by the year 2000, 200 or more communities west of the Mississippi River will either be experiencing or anticipating energy impact (Olson and Uhlmann 1981; Houston 1977; Uhlmann 1978).

Many of these communities are located in the nation's primary oil and gas producing state of Texas. Since 1930, 40 percent of the nation's oil and gas has been produced in Texas (Hoch 1977). The state's current contribution to the nation's energy supply has declined from historic levels, but it still stands at an impressive 21 percent (Arnold 1983; Texas Energy and Natural Resources Advisory Council 1983). Since Texas still holds 25 percent of the nation's natural gas reserves and 27.5 percent of the crude oil reserves, many rural Texas communities could experience oil and gas impact.

As succeeding oil and gas impacts occur in Texas, experiences from the acute health care delivery systems in established rural Texas oil and gas communities could be beneficial. Data about the acute health care delivery systems' response during preceding oil and gas impacts in Texas could provide baseline information for both community and state policy decisions.

Purpose of the Study

This study examined what changes occurred in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle.

Statement of the Problem

The problem addressed by this study is what changes occurred in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle.

Research Questions

Specifically, this study investigated the acute health care delivery system components of hospitals, health care provider offices and emergency medical services. The study answers the following questions:

(1) What changes occurred in health manpower resources during the energy impact cycle?

(2) What changes occurred in service capabilities during the energy impact cycle?

(3) What changes occurred in the operational status during the energy impact cycle?

(4) What changes occurred in the physical infrastructures during the energy impact cycle?

(5) What changes occurred in health care clients during the energy impact cycle?

(6) What major problems were encountered in the acute health care delivery system during the energy impact cycle?

Organization of the Remainder of the Study

The remainder of this study is presented in five chapters. Chapter II contains an overview of the energy impact scenario and the definitions used in the study. The methodology of the study is presented in Chapter III. The following topics are discussed: design of the study, selection of subjects, instrumentation, procedures, and data analysis. In Chapter IV, findings from the survey and interview data are reported and analyzed in terms of the research questions presented in this chapter. A discussion of the findings is presented in Chapter V. The study is summarized in Chapter VI.

CHAPTER II

OVERVIEW OF THE ENERGY IMPACT SCENARIO

This chapter presents an overview of the scenario surrounding the energy impact cycle. The chapter concludes with definitions of terms used in the study.

The Energy Impact Scenario

The energy impact scenario involves the exploration, development and production of such native energy resources as oil, gas, and coal. Events that precede and accompany these energy activities are depicted in the Energy Impact Scenario Model (Figure 2.1).

The Energy Impact Scenario Model specifically identifies that that (1) external and internal forces influence the energy industries' exploration, development, and production activities, (2) the intensity of these energy activities determines what stage of energy impact the rural community is experiencing, and (3) with each stage of energy impact, changes occur in the community's industrial, employment, and population levels, its local economy, and its infrastructures. A discussion about each component of the model follows.

Influencing Forces

Both external and internal forces, either alone or in a reciprocal relationship, wield considerable influence on the present and future status of energy exploration, development, and production activities. The vigor of these forces dictates the duration and intensity of energy activities in the local community.

External forces are those policies, perspectives, and economic conditions that occur outside the local community, but set the tone and pace for energy activities of exploration, development, and production in the local community. For instance, policy decisions that determine the nature and extent of resource development are made by energy industry and government officials. Other policies which affect energy activity levels include regulation of leasing procedures, energy price controls, taxation of energy products, measures to protect the environment, and subsidies for various energy activities (Ball

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Energy Impact Scenario

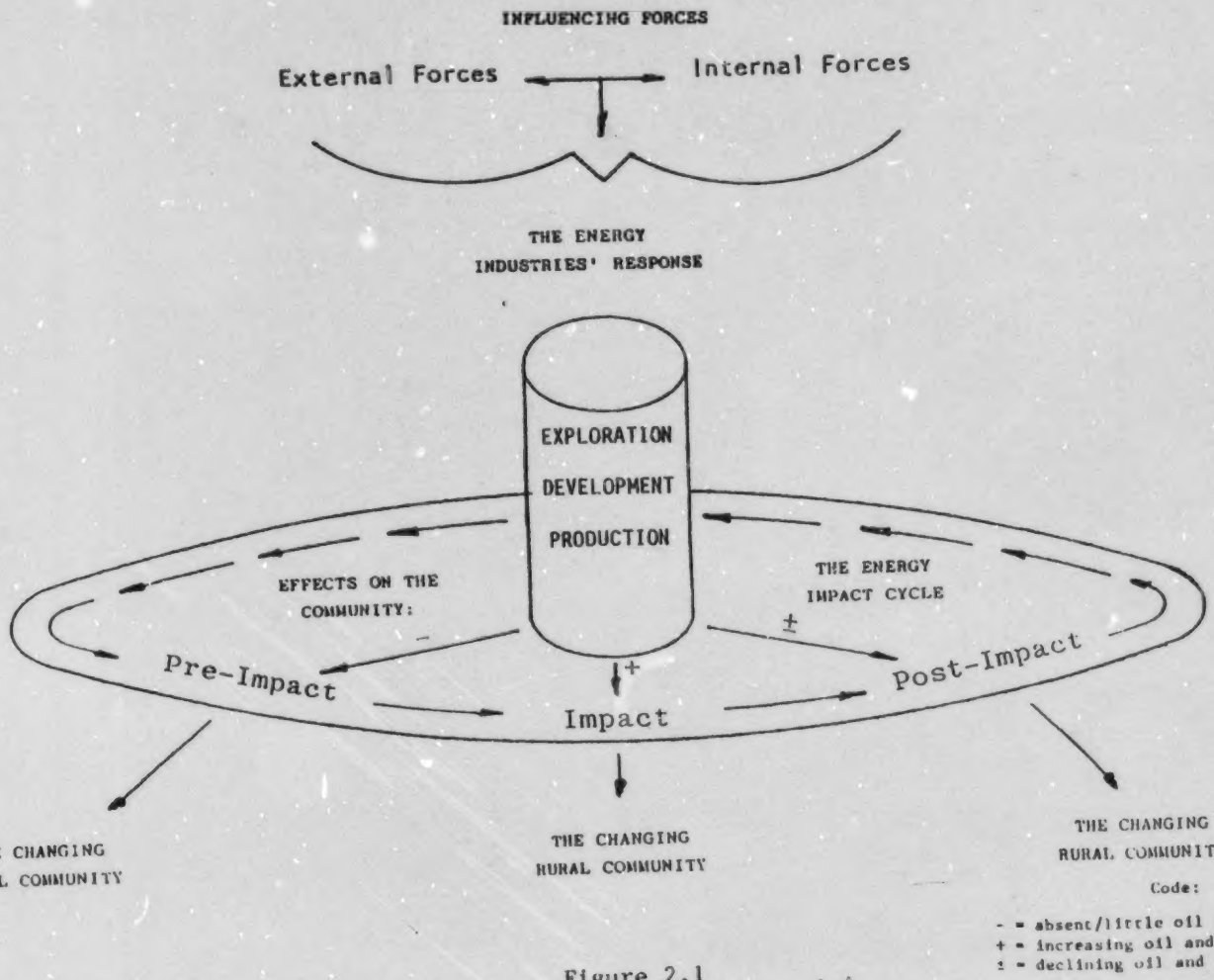

Figure 2.1

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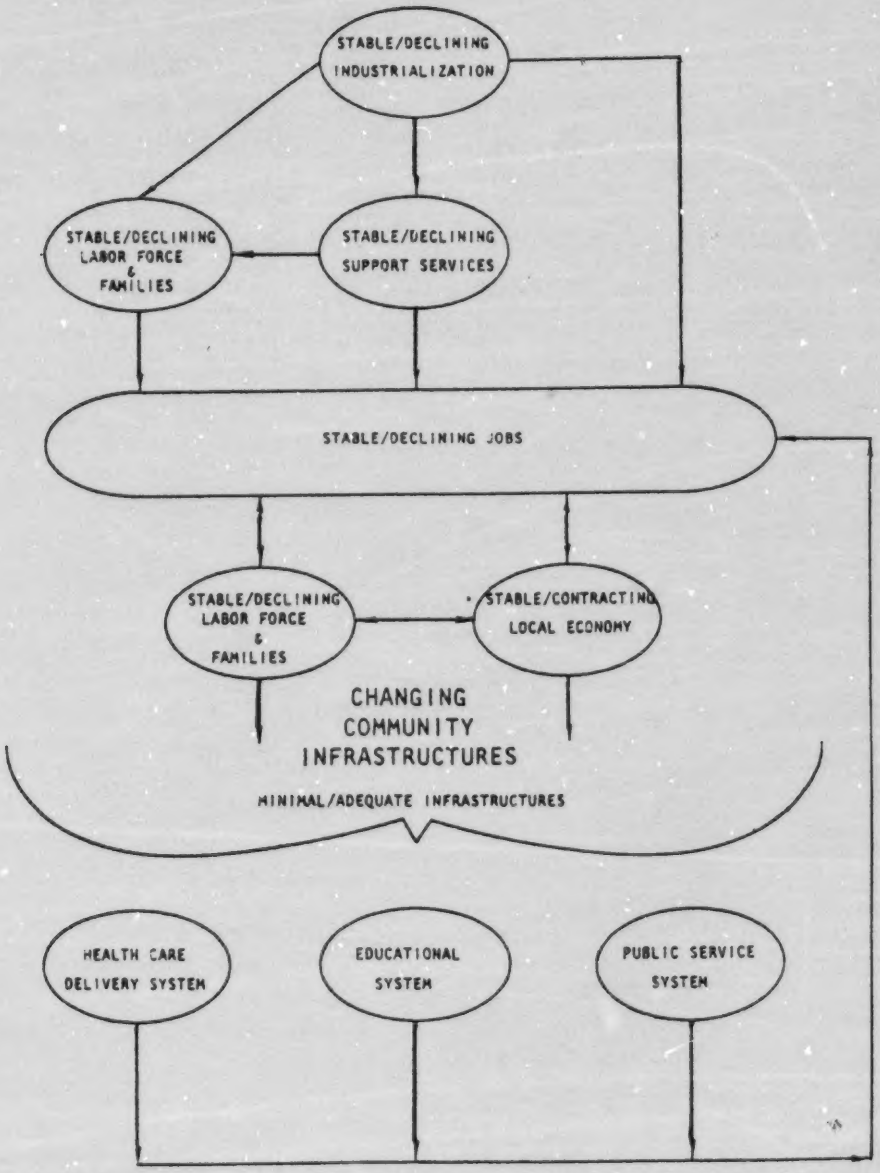
THE CHANGING RURAL COMMUNITY

PRE-IMPACT



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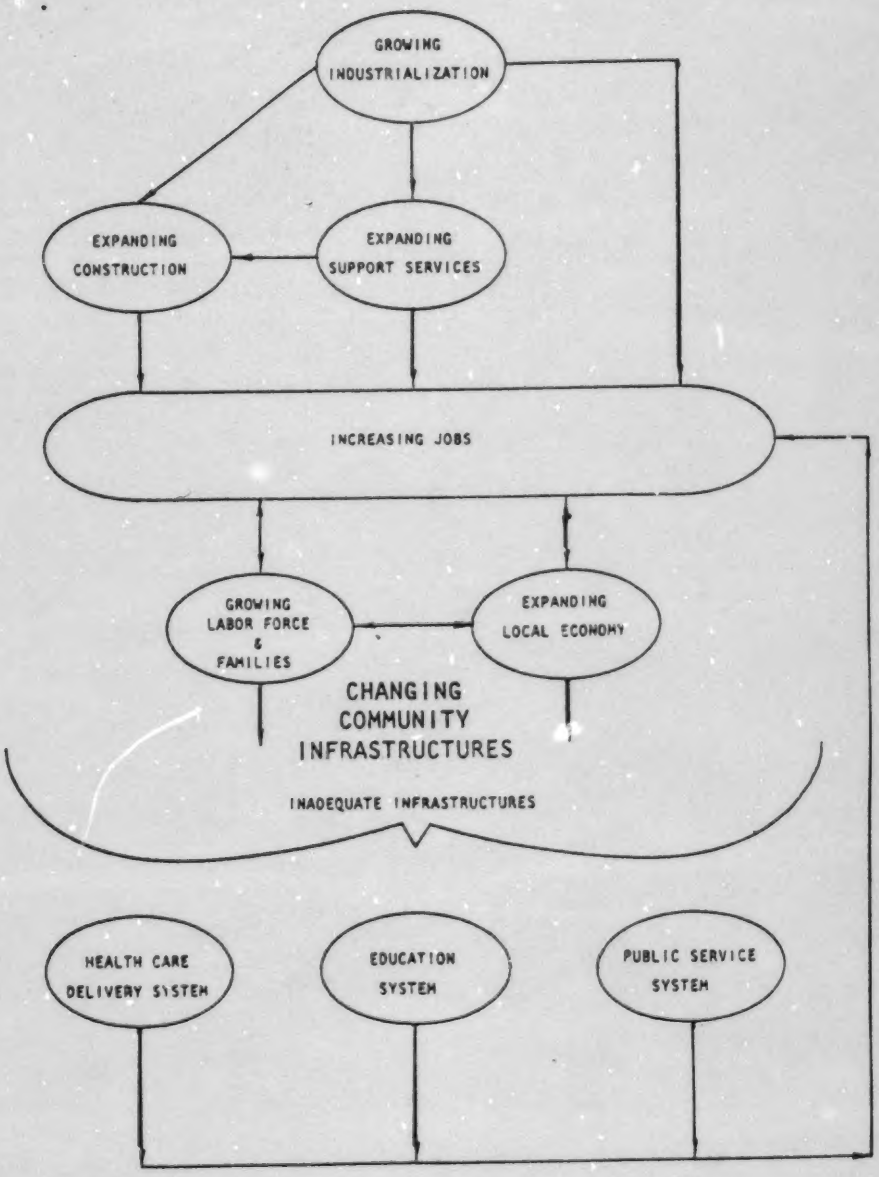
THE CHANGING RURAL COMMUNITY

IMPACT



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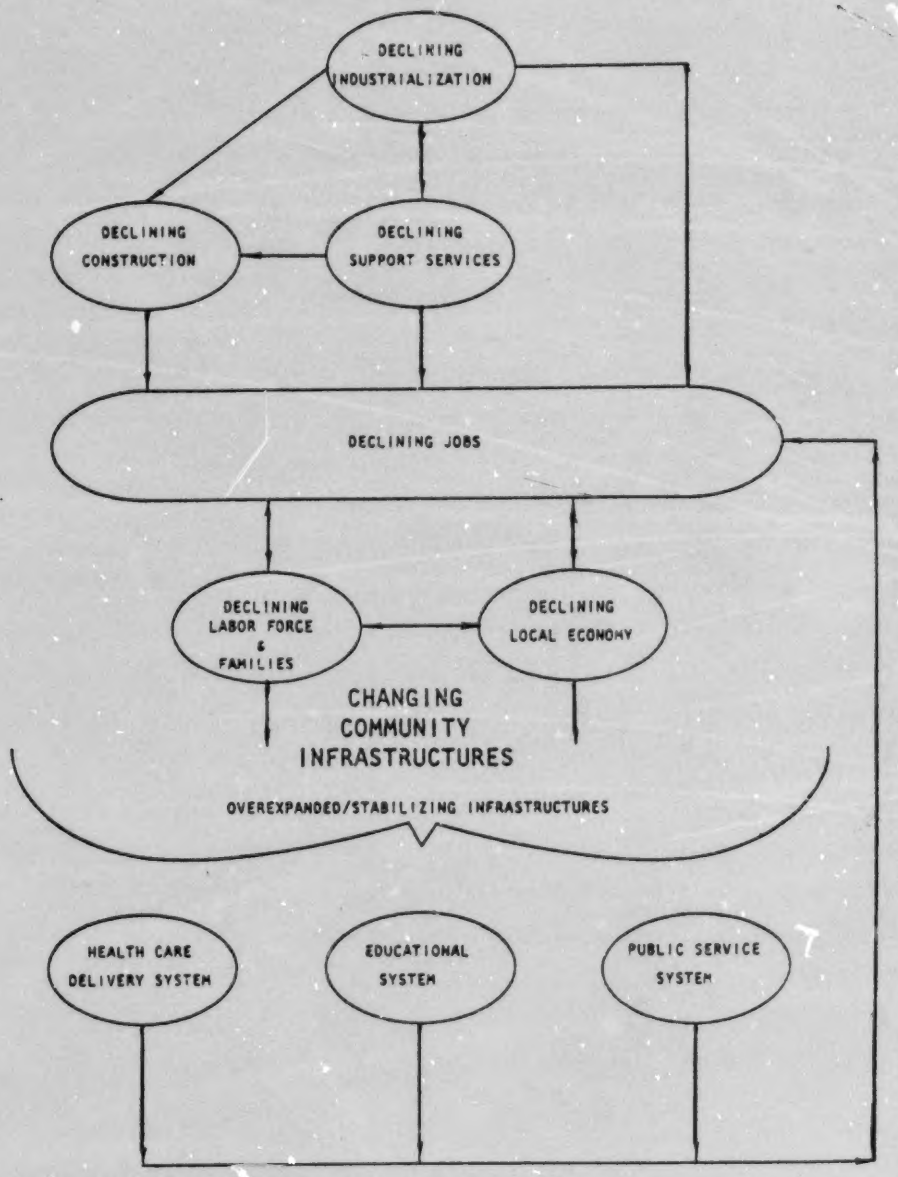
THE CHANGING RURAL COMMUNITY

POST-IMPACT



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1983; Cortese 1979; Organisation for Economic Co-Operation and Development 1981; Reische 1975; Reynolds 1983; Rosenbaum 1981).

Individual perspectives on such subjects as energy conservation methods, efficiency of alternative energy sources, convenience of various energy products, and economic forecasts can create vast fluctuations in energy activities. Other perspectives on technological advances in relation to energy supplies, the political ramification of energy activities, and the source of future energy products also affect to what extent the local community becomes involved with energy activities.

The economic conditions that affect energy activities revolve around (1) the supply of energy products, (2) the demand for energy products, and (3) the price of energy products. The balance between supply, demand, and cost is delicate because an alteration in any one factor affects the economic dynamics associated with energy exploration, development, and production in the local community (Exxon Corporation 1980; Olien 1982; Reische 1975; Reynolds 1983).

Internal forces vary from external forces in that they involve only characteristics of the local community and any developments within the local community that contribute to energy activities. Characteristics of the local community include such variables as its size, location, relation to other communities (distance and dominance), history, level of infrastructural and economic development, and availability of energy resources. Developments within the community involve events occurring in the local government, industries, economy, values, and infrastructures. (Chase and Leistritz 1982; Cortese 1979A; Gilmore et al 1977; "Rig Count..." 1983; "Slowdown Affects..." 1982).

Overall, the three interrelated external forces of policies, perspectives, and economics combined with internal community forces exert a powerful influence on both the discovery rates for energy products and the exploitation of proven energy reserves. Although these forces can act independently, they most often operate in combination with one another to determine the magnitude of energy activities.

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The Energy Industry's Response: Energy Activities of Exploration, Development and Production

Both the mining and oil and gas industries engage in exploration, development, and production activities. However, many differences exist between the energy activities used for mining of coal as compared to the exploitation of oil and gas.

The mining process is primarily a one-industry operation for securing the leases, initiating exploration, development and production procedures, and employing the needed workers. The entire project, beginning with exploration and continuing through the construction of processing and power plants, mining of the energy resource, and production of energy products, takes several years. Depending on the size of the operation, two hundred to eight hundred employees are needed for exploration and construction. This initial development requires 400 to 900 percent more workers than the later stages of operation and production (Inter-Industry Technical Assistance Team 1980).

On the other hand, the exploration, development, and production of oil and gas involves numerous major corporations and supporting companies. Within an oil and gas region or basin, the major corporations that own the energy leases subcontract all seismic, drilling, equipment, and communication tasks to small task-specific companies.

The oil and gas industry also differs from the mining industry because it is fragmented by uncoordinated and ever-changing time periods. Rather than taking months or years to explore and produce energy products, the oil and gas industry can purchase an energy site, then explore and develop that energy site within sixty days. While these energy activities are occurring, one thousand workers can be added to a community's labor force. Often 70 to 90 percent of these workers in-migrate to the local community, residing only as long as energy-related jobs exist.

It is uncertain how long these energy-related workers will reside in the community because the oil and gas industry, unlike the mining industry, cannot rely on exploratory data. Prior to the actual drilling of an oil or gas well, exploratory methods produce only speculative data. Once drilling activities confirm the presence of oil or gas, questions still remain as to the amount and quality of the oil and gas and the speed of resource recovery. Additional wells must be drilled to determine the extent of the oil basin. Because the exploration for oil may cover thousands of acres, a community can be simul-

taneously experiencing several energy activities sequenced over time in loose relation to one another. However, each drilling venture affects future oil and gas activities within the community (Briscoe, Maphis, Murray, and Lamont, Inc. 1981; Chase and Leistritz 1982; Roosevelt-Custer Regional Council 1981; Shontz 1980).

Regardless of the energy resource, exploration, development, and production activities must occur. The activities for the various energy industries vary in terms of employee requirements, company affiliations, and time periods, but the occurrence of these activities produces similar effects on the local community.

Effects On The Community--The Energy Impact Cycle

The absence or presence and the rate and magnitude of these activities has a profound effect on the cyclical energy impact stages experienced by communities within and adjacent to the energy area.

In the pre-impact stage, energy activities are either (1) present, but in stable amounts, (2) absent with the exception of off-site preliminary studies, or (3) completely absent. During the impact stage energy activities are either (1) substantially increased from the previous stable levels or (2) suddenly initiated as a community industry with all the demands of an industry. Energy activities with post-impact either (1) decline and then stabilize, (2) gradually and progressively decline from peak levels, or (3) suddenly and sharply decline from peak levels. During post-impact, the energy activities are substantially below impact levels but considerably above pre-impact levels (Cortese and Jones 1979B; Dickson et al. 1977; Freudenburg 1981; Real Estate Research Corporation 1975).

The Changing Rural Community

Since the stages of the energy impact cycle progressively revolve around the intensity of energy activities, changes in these energy activities can cause a community to be suddenly or gradually transformed from one stage to another. Characteristics of the changing rural community during each stage of the energy impact cycle follow.

The Pre-Impact Stage

Changes in a pre-impact community cause it to experience a semi-stable or declining existence. Almost any change is noticed in this community because it is generally small--with a population of less than 2,500, experiencing a population decline, located many miles from a Metropolitan Statistical Area, and dependent on a single industry (Albrecht 1978; Bates 1930; Murdock, Leistritz, and Schriner 1982; Nellis 1974; Olsen and Uhlmann 1981; Roosevelt-Custer Regional Council 1981; Uhlmann 1978; University of Wyoming 1975).

Often agriculture is the community's chief industry, but other industries such as tourism, recreation, or small-scale resource development may also be present (Davenport 1981B; Kassover and McKeown 1981; Lund 1974; Roosevelt-Custer Regional Council 1981; Van Sandt et al. 1982). As these industries fluctuate with economic, climatic, political, technological, or societal conditions, the community's employment, population, and economic levels either contract or stabilize (Albrecht 1978; Beale 1974; Cortese and Jones 1974A; Dickson 1977; Ellenbogen 1974; Gilmore 1976; Gilmore and Duff 1974; Jacobson 1976; Little 1978; Longbrake 1979; Lund 1974; Murdock, Leistritz and Schriner 1982; Olson 1981; Orleans 1976; Rogers 1982; Roosevelt-Custer Regional Council 1981; Thompson et al. 1982; Uhlmann 1978; Weber 1979).

The Impact Stage

The "most prominent and formidable characteristic of impact communities is their proclivity to change frequently at greatly accelerated rates" (Bougsty 1975). Once oil and gas exploration activities are initiated in the community, there is an immediate need for oil and gas support services, construction activities, and employees.

The local labor force increases because with mining, two hundred to eight hundred primary jobs are created for exploration and construction, twenty to one hundred jobs are created for operation and production (Inter-Industry Teachnical Assistance Team 1980), and 0.3 to 0.9 secondary jobs are created for each new energy worker (Williams 1976). With oil and gas activities, the labor force also increases because approximately one hundred primary jobs are creatd with each drilling rig, eight to ten primary jobs are creatd with each completed well, and numerous secondary jobs are created for each new oil and gas worker (Shontz 1980). Frequently, energy impact communities have a mismatch between the occupational requirements of the oil and gas industry and

the job skills possessed by local residents (Little and Lovejoy 1979). This, combined with national reports about the community's rapid industrial growth, attracts newcomers, i.e., individuals from outside the community who come into the community (Ballard and Clark 1980; Briscoe 1981).

It is rarely easy to predict or estimate this sudden increase in population (Olien 1982), but with impact the rural community will most likely experience an annual population increased exceeding 5 percent (Murdock, Leistritz and Schriner 1982; Olsen and Uhlmann 1981; Slaughter et al. 1982). Generally, newcomers are younger, better educated, higher wage earners, more likely to settle in temporary living arrangements, and more likely to be directly involved in the oil and gas industry with skilled and managerial jobs than are the established community residents (Bauder 1975; Bickert 1974; Bougsty 1975; Briscoe et al. 1981; Chase and Leistritz 1982; Leholm, Leistritz, and Wieland 1976; Lillydahl et al. 1982; Massey and Lewis 1979; Murdock, Leistritz and Schriner 1980, 1982; Shontz 1980; Wieland, Leistritz, and Murdock 1977).

Initially, the community may experience a temporary cash flow problem, but in time its money supply increases, resulting in new purchaseing power, growing bank deposits, an expanded tax base, and increased job opportunities. An unfortunate effect on the community's economy is the inflated cost for goods and services which is especially detrimental to individuals who are on fixed incomes or unable to secure employment (Ballard and Copp 1982; Bates 1978; Freudenburg 1981; Kresge 1980; Leistritz, Murdock and Leholm 1982; Milkman et al. 1980;Sanderson-Stinson 1977; Summers 1973; Suskind and O'Hare 1977; University of Wyoming 1975; U.S. Department of Energy 1980).

The Post-Impact Stage

As the oil and gas activities decline, a ripple effect causes a corresponding decline in oil and gas support services, construction activity, employment rate, and population (Dickson 1977; Halstead, Chase and Leistritz 1983; Kresge 1980; Lillydahl 1982; Root 1979). Although many of the temporary newcomers leave the community, the population exodus during post-impact is generally not as intense as the population influx during impact because some residents continue to reside in the community and wait for renewed energy activities (Kresge 1980).

Accompanying the community decline is a decreasing amount of circulating capital. The consequences include (1) loss of payroll, revenue, and corporate income and property tax for the community's tax base, (2) lower per capita incomes than would have occurred in the absence of energy impact, (3) decline in demand for goods and services, and (4) increased costs for permanent residents who are expected to pay for expanded services needed during impact (Dickson 1977; Halstead, Chase, and Leistritz 1983; Olien 1982; Root 1979; Sanderson-Stinson 1977; Warrack 1982).

Overall, the community's industrialization, employment, population, and economic levels decline, but the effects of the decline are dependent on the (1) size of the economic base established by the energy industry, (2) duration of energy activities, (3) presence of replacement industry, and (4) size and location of the community (Dickson 1977; Halstead, Chase and Leistritz 1983; Root 1979; Sanderson-Stinson 1977).

The Changing Rural Community Infrastructures

For this study, community infrastructures consist of the health care, education, and public service systems. The size, status, and job-creating potential of these community infrastructures correlates with the size and stability of the community (Little 1978).

The Pre-Impact Stage

Due to its location, the pre-impact community has to develop its own infrastructures (Albrecht 1978; Gilmore 1976). Since the community has meager financial reserves, its infrastructures are often relatively unsophisticated and capable of providing only limited services (Christianson 1981; Copp 1982; Daberkow and King 1980; Davenport and Davenport 1979; Olsen and Uhlmann 1981; Perlstadt 1984; Radtke et al. 1979; Rogers 1982; Rosenblatt 1982; Thompson et al. 1982).

Health care services are minimal because the community often has difficulty attracting health care providers. Even if the community has health care providers, its per capita ratio of physicians, nurses, allied health staff, and emergency medical service attendants is consistently lower than that in urban areas (Ahearn 1979; Clemente and Krannich 1982; Cordes 1976, 1978B; Davis and Marshall 1976; Hassinger 1982; Nixon 1981; Ohsen and Uhlmann 1981; Parker and Sorenson 1978; Roemer 1978; Rosenblatt and Moscovice 1982). Of all

the infrastructures, the education system often provides the most up-to-date services within the community, but student numbers are often low due to the out-migration of young people (Ballard and Copp 1982; Rogers 1982). Public services are frequently characterized by inefficient sewage disposal methods, numerous private drinking water systems, minimal water supplies, antiquated electrical lines, poor streets, limited garbage collection, minimal fire protection, and one-man police departments (Davenport and Davenport 1979; Gilmore 1976; Rogers 1982).

Overall, the community's infrastructures can be characterized as minimal, but adequate. Generally, each service operates at a capacity level and tries to provide a full range of services. In many cases, residents are grateful for these "city-like conveniences."

The Impact Stage

"Undoubtedly, the knottiest impact problem faced by industry (and the impact community) is the lag in infrastructural services that takes place when a rural community begins to expand" (Jacobson 1976). Immediately the community's become inadequate.

The health care delivery system experiences changes in (1) the number of clients seeking services and the conditions for which they seek treatment, (2) the need for expanded services, (3) the need for more health care providers and health care providers with special skills, and (4) the need for building renovations and expansion projects (Bougsty 1980; Briscoe et al. 1981; Burke 1976; Dixon 1978; Freudenburg 1982; Gilmore and Duff 1974; Halstead and Leistritz 1983; Lantz and McKeown 1977, 1979; Larsen 1977; Leistritz and Maki 1981; Mollard 1982; Olsen and Uhlmann 1981; Roosevelt-Custer Regional Council 1982; Ross 1980; Sanderson-Stinson 1977; Slaughter, Taylor and Uhlmann 1982; Thompson, Branch and Williams 1982).

In the educational system enrollments markedly increase, causing a tremendous strain on educational manpower and structural and learning resources (Fison and Quisenberry 1977; Smette 1981). Public services are stretched beyond their capabilities with needs for additional water and waste disposal sites, upgraded and enlarged streets, more electrical capabilities, and modernized fire and police departments (Olien 1982; U.S. Department of Energy 1980).

Demands from the energy industrialization process necessitate immediate changes within each infrastructure. However, there are limits to how rapidly the infrastructures can expand to meet the needs of industrialization. Also, one ever-present question is the extent to which infrastructures should expand their service, manpower, technological and resource capabilities.

The Post-Impact Stage

The decline in energy activities has a parallel effect on the utilization and financial stability of the community's infrastructures. Since a slowdown in energy activities usually comes without much advance warning, the danger exists that the various infrastructures may be overexpanded.

In the health care delivery system, services are often in the process of expansion when the slowdown occurs. Frequently, these expansion projects to increase numbers of health providers, renovate health care facilities and upgrade technological capabilities cannot be stopped (Milburn 1983). The delivery of educational services also fluctuates because enrollments correspond to the number of residents leaving the community. If many residents do not leave the community, school enrollments begin to stabilize (Halstead, Chase, and Leistritz 1983; Olien 1982). Demands for public service also vary, with (1) electrical, sewage and water lines being underused since there are fewer community residents and (2) public safety services continuing at impact levels because of a rising unemployment levels (Halstead, Chase, and Leistritz 1983; Milkman et al. 1980).

Overall, infrastructures in post-impact communities are either over-expanded or stabilizing. The determining factor is the intensity of the energy industry's decline in the community.

Summary of the Energy Scenario Model

The Energy Impact Scenario Model identifies events that precede and accompany energy activities in a community. External and internal forces determine the extent to which energy exploration, development and production will occur in the community. In turn, the intensity of these energy activities causes the community to be in the cyclical and sequential stage of either pre-impact, impact, or post-impact. During and between each stage, the community experiences changes in its industrial, population, and employment levels, its local economy, and its community infrastructures.

Definition of Terms

For the purposes of this study, the terms listed below are defined as follows:

Acute Health Care Agency - Indicates one or more of the following components within the acute health care delivery system: emergency medical service, health care provider office, or hospital.

Acute Health Care Delivery System - All emergency medical services, health care provider offices, and hospitals in a rural energy impact community that provide care for life treatening conditions.

Administrator - The individual responsible for management of an emergency medical service, a health care provider office, or a hospital.

Agency Representative - Any individual serving as a volunteer or employee in an acute health care agency.

Community Residents - Individuals who live in a rural energy impact community.

Emergency Medical Service - An acute health care agency whose primary function is to provide transportation for individuals with life treatening conditions.

Energy Impact Cycle - A variable period of time, at least three years in length, when the stages of pre-impact, impact, and post-impact occur:

Pre-impact - the calendar year immediately preceding impact when the number of drilling rigs and the number of mining employees (for oil and gas exploration and drilling, well operations and maintenance, and the operation of natural gas and cycle plants) were at their lowest level before increasing with impact.

Impact - the calendar year after pre-impact when the number of drilling rigs and the number of mining employees (for oil and gas exploration and drilling, well operations and maintenance, and the operation of natural gas and cycle plants) were at their highest level.

Post-impact - the calendar year after impact when the number of drilling rigs and the number of mining employees (for oil and gas exploration and drilling, well operations and maintenance, and the operation of natural gas and cycle plants) were at their lowest level.

Health Care Clients - This term is used as a study variable to denote all individuals who receive services from an acute health care agency.

Health Care Provider Office - An acute health care agency that uses physicians, nurses, physician assistants, and/or nurse practitioners to provide outpatient care for life threatening conditions and routine health care services.

Health Manpower Resources - This term is used as a study variable to denote all individuals employed by an acute health care agency.

Hospital - An acute health care agency which renders both in-patient and out-patient care for various health care conditions, including life threatening conditions.

Oil and Gas Activities - Number of rigs and employees involved with the exploration, development, and production of oil and gas. The rig count is the best barometer indicating the health of the oil industry ("Petroleum Executive..." 1983; Roosevelt-Custer Regional Council 1981; Texas Energy and Natural Resources Advisory Council 1982; "The Indicators..." 1983).

Operational Status - This term is used as a study variable to denote factors that involve management of the acute health care agency, such as financial status and utilization.

Physical Infrastructures - This term is used as a study variable to denote the home base of the acute health care agency, its building and structures within the building.

Rural Energy Impact Community - A rural Texas community (1) whose population in 1970 and 1980 did not exceed 20,000, (2) which is located more than 50 miles from a city with a population of more than 50,000, (3) which possesses a minimum of one hospital, health care provider office, and emergency medical service, (4) which has experienced the energy impact cycle in the past decade because of oil and gas activities, and (5) which has not experienced any other type of energy development, i.e., coal, uranium, nuclear power, or hydroelectric power, in the past decade.

Service Capabilities - This term is used as a study variable to denote all equipment, programs, services, and abilities that the acute health care agency is able to render because of its technical, manpower, and physical resources.

Summary of Chapter II

In this chapter, the energy impact scenario and its major concepts were reviewed. The chapter concluded with the definition of terms used in this study. The remainder of the study is presented in Chapter III, the methodology; Chapter IV, the findings; Chapter V, the discussion of findings; and Chapter VI, the summary, conclusions, and implications of the study.

CHAPTER III

METHODS

This chapter describes the design of the study, selection of the sample, and instrumentation. Also, it details procedures and data analysis techniques.

Design of the Study

A retrospective survey type of design was used for this study. This design was selected because it allowed the investigator "to conduct a systematic empirical inquiry in which the scientist did not have direct control of independent variables because their manifestation had already occurred and because they were inherently not manipulable" (Kerlinger 1973). Such a design was necessary because the energy impact cycle under study in each community had already occurred and was no longer subject to experimental treatment.

Although the retrospective survey design does not impose experimental controls or support cause and effect relationships, it offers two advantages for an exploratory study. Since a survey lacks the artificiality that frequently accompanies laboratory experiments, "the results are more likely to be generalizable to other realistic settings" (Polit and Hungler 1978). Second, the results can provide an initial database from which to generate hypotheses for later research (Polit and Hungler 1978).

Sample

Data were collected from the acute health care delivery systems of five rural energy impact communities in Texas. Sample size was determined in light of statistical, economic, and time considerations.

The selection process did not occur until a pool of rural Texas energy impact communities had been identified. The investigator asked one hundred individuals who possessed knowledge about rural communities, population levels, and oil and gas activity in Texas to serve as a panel of experts for the community identification process. Composition of the panel of experts was as follows:

Eighteen individuals who served as administrators in oil and gas associations and oil and gas companies in Texas.

Ten individuals who were employed in Texas universities and engaged in research about oil and gas activities or population levels in Texas.

Thirty-two individuals who served as administrators in community organizations, agencies, and associations such as councils of government, regional planning commissions, chamber of commerce associations, and historical societies.

Forty individuals who were associated with state agencies, including the Railroad Commission, Comptroller's Office, General Land Office, Department of Community Affairs, Agricultural Extension Service, Texas Economic Development Commission, and Texas Legislature, and worked with oil and gas activity and population data.

These individuals were sent a letter that 1) discussed the study, 2) identified why they were asked to participate, and 3) requested their participation in the community identification process. Enclosed in the letter was a self-addressed, stamped card for their reply. The message on the card read, "Please list four rural Texas communities that in the past ten years have experienced both a boom and a bust or stabilization associated with local oil and gas exploration and development."

For purposes of the community identification process, the terms "boom" and "bust or stabilization" were used to denote the impact stages used in this study. The investigator decided to use these terms after consulting with individuals from oil and gas organizations, universities, community organizations, and state agencies. All the individuals contacted except those from universities were more familiar with the terms "boom" and "bust or stabilization" than with the terms "pre-impact," "impact," and "post-impact."

Of the one hundred letters sent, fifty-seven individuals (57 percent) responded. This accounted for a response rate of 37 percent (six) from oil and gas organizations and agencies, 70 percent (seven) from university research centers, 59 percent (nineteen) from community organizations, agencies and associations, and 63 percent (twenty-five) from state agencies.

A total of 111 communities were nominated by the panel of experts. Before the selection process continued, the investigator collected information about each community's population, its local energy activities and its acute health care delivery system. This information was obtained from the following sources:

--population data from the U.S. Census Bureau, the University of Texas Bureau of Business Research, and the Texas Data Center,
--energy activity data from the Texas Railroad Commission, Texas Public Utilities Commission, Hughes Tool Company, Texas Mid-Continental Gas Company, Texas Department of Water Resources, American Petroleum Institute, The University of Texas Bureau of Economic Geology, and the Texas Employment Commission,

--acute health care delivery system data about the:
  --hospital from the Texas Hospital Association and the Bureau of State Health Planning and Resource Development at the Texas Department of Health,
  --emergency medical service from the Bureau of Emergency Management at the Texas Department of Health, and
  --health care provider office from the Texas Medical Association, the Texas Board of Medical Examiners, and the Texas Board of Nurse Examiners.

Once information was collected about the communities, each community was compared to the following criteria:

(1) the community's population in 1970 and 1980 did not exceed 20,000,
(2) the community is located more than 50 miles from a city of more than 50,000 population,
(3) the community possesses a minimum of one hospital, health care provider office, and emergency medical service, and
(4) the community experienced the energy impact cycle in the past decade because of oil and gas activities,
(5) the community had not experienced any other type of energy development, i.e., coal, uranium, nuclear power, or hydro-electric power, in the past decade.

Thirty-five communities met the criteria. Of this number, fourteen communities received from two to nineteen votes each and twenty-one communities received one vote each. The fourteen communities receiving more than one vote were plotted on a Texas map. Five natural clusters became evident. See Figure 3.1 for a regional breakdown of these clusters. In each cluster, the community receiving the most nominations served as the study community. Two of the study communities received two nominations and the other three received nineteen, five, and four nominations respectively.

After these five communities were selected, the names and addresses for each acute health care agency that was in the community during the energy impact cycle and its administrator were obtained from the appropriate state association or agency. After obtaining the general information about each acute health care agency, the investigator telephoned the administrator of each agency to inform him of the study and request the agency's voluntary participation. If the administrator agreed to the study, the investigator set up a date with the administrator for visitation of the acute health care agency.

Instruments

This study used five instruments, three survey tools and two interview questionnaires. The survey tools addressed what changes occurred in the acute

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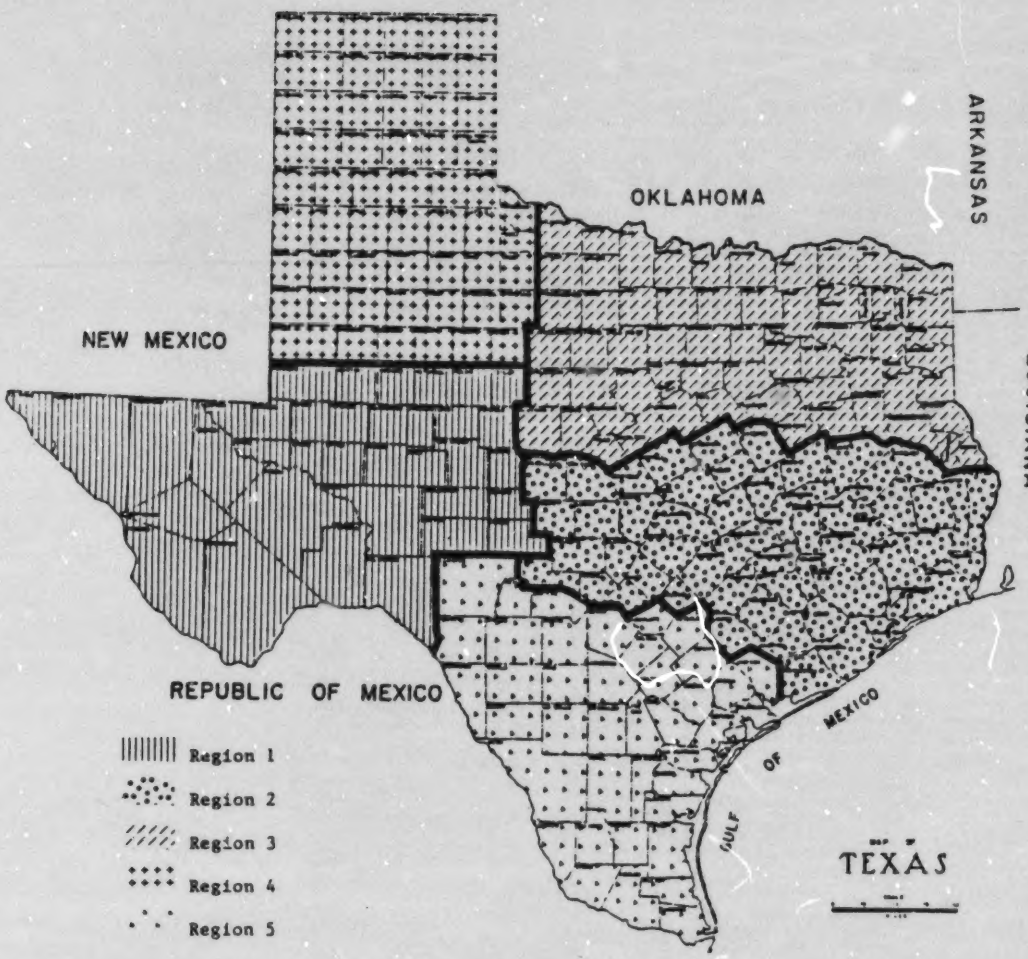

Regions of Study Communities

Figure 3.1

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health care agencies. Specifically, these tools were designed to collect quantitative data about four variables, namely health manpower resources, operational status, physical infrastructures (hospital only), and health care clients.

The interview questionnaires were designed to obtain qualitative information from agency representatives and community residents. Both interview questionnaires consisted of the following general topic areas:

(1) General data about the energy impact cycle and its overall effects on the community.

(2) General data on the nature of changes and problems occurring in the acute health care delivery system's health manpower resources, service capabilities, operational status, physical infrastructures, and health care clients during the energy impact cycle.

Development of Instruments

The development of the survey tools and interview questionnaires was based on a comprehensive literature review, discussions with both rural health and energy impact investigators, and visits with administrators and agency representatives in rural communities. Information for developing the instruments was also obtained from a case study of the health care delivery system in a rural energy impact community that was conducted by the investigator, and from the investigator's personal experience as a nurse supervisor and educator in the acute health care delivery system of a rural energy impact community.

Validation of Instruments

Validity of the instruments was determined by a panel of nineteen experts representing academia, agencies within the acute health care delivery system, and national and state health-related departments and organizations. Members of the panel were experts in one or more of the following areas: 1) rural energy impact communities, 2) rural energy impact communities in Texas, 3) acute health care delivery systems in rural energy impact communities, 4) acute health care delivery systems in rural Texas, or 5) acute health care delivery systems in rural energy impact communities in Texas.

Fifteen of the panel members were asked to serve as reviewers for one or two of the five instruments. The other four panel members were asked to re-

view all five instruments to determine overall validity of the instruments for the study. In response to the panel of experts' review, revisions were made.

The instruments' validity was also assessed during a pilot study. The community selected for the pilot study was nominated as a rural energy impact community by the panel of experts, but was not included as one of the five study communities. The specific pilot community was selected because its population was closest to the mean population of the fourteen communities receiving more than one vote from the panel of experts for community selection. The mean 1980 population of these fourteen communities was 5,300. The 1980 population of the pilot community was five thousand.

In the pilot study, the investigator went through the entire data collection process. Survey data were obtained from the community's hospital, emergency medical services, and health care provider office. Interview data were obtained from nine agency representatives and twelve community residents. After the pilot study, the instruments were again revised, then edited and reproduced for data collection.

Procedures

The first step in collecting data was to identify when pre-impact, impact, and post-impact occurred in each community. These three stages were determined in a three-step process. First, records for the past ten years about the number of drilling rigs in each Texas Railroad Commission District (from the Hughes Tool Company) and the number of mining employees for oil and gas exploration, drilling, well operations and maintenance, and the operation of natural gas and cycle plants in each Texas county (from the Texas Employment Commission) were reviewed to identify which calendar year best corresponded with each stage. Records for the past ten years were reviewed because the energy impact cycle occurs in Texas every seven to eight years (Ball 1983; Olien and Olien 1982; Sanderson-Stinson 1977). Second, a minimum of four individuals who were associated with oil and gas companies and/or the city government in each study community were asked to identify during which calendar year in the past ten years pre-impact, impact, and post-impact occurred in their community. Third, the calendar years having the strongest support from steps one and two as being the pre-impact, impact, and post-impact years were studied in each community.

The next step in collecting data was to obtain annual reports about the study communities' emergency medical services and hospitals from the Texas Department of Health. Information on the emergency medical services was collected from the Bureau of Emergency Management's Response Data System Reports. Hospital data were obtained from the Bureau of State Health Planning and Resource Development's Annual Hospital Survey. These data were used in the emergency medical services and hospital survey forms.

The investigator then visited each of the selected rural energy impact communities to collect data. During these three to four day visits, (1) survey data were collected from the emergency medical service, the health care provider offices, and the hospital, (2) interviews were conducted with agency representatives in the emergency medical services, the health care provider offices, and the hospital, and (3) interviews were conducted with randomly selected community residents. During the investigator's visits to the study communities, survey data were collected from 100 percent of the hospitals (N=5), 100 percent of the emergency medical services (N=5), and 100 percent of the health care provider offices (N=17). Interviews were conducted with a total of 48 agency representatives and 50 community residents. Next, the procedures used for collecting these data will be detailed.

Survey Data

In each acute health care agency, the investigator first met with the administrator or the administrator's designated agency representative to discuss the study. The following points were covered:

(1) Purpose of the study.

(2) Procedures involved in the study, such as type of record and interview data needed, participants needed from the agency, length of time anticipated with agency representatives, and when the information would be collected.

(3) Participation in the study was voluntary.

(4) The agency had the freedom to withdraw from the study at any time.

(5) Each community, each acute health care agency, and each participating agency representative would be given a code number in lieu of their name.

(6) The privacy and confidentiality of agency record and individual patient record data (if needed) would be protected.

(7) All information obtained from the agency would be kept under lock and key.

(8) Any information that was obtained in connection with the study and could be identified with the agency or agency representative would be disclosed only with their permission.

(9) A summary of the study would be given to the administrator upon completion of the study.

(10) The administrator would be given a copy of the consent form for his future reference.

Once these points were discussed, (1) the investigator offered the informed consent to the administrator and obtained his signature and (2) the administrator introduced the investigator to agency representatives who would evaluate the accuracy of state agency data used in the survey and assist the investigator in obtaining data to complete the survey. The investigator then set up appointments with these individuals. These agency representatives by agency were:

Emergency Medical Service - directors in four agencies and attendants in four agencies;

Health Care Provider Office - physicians in fourteen offices, nurses and receptionists in eight offices, and an administrator in one office;

Hospitals - administrators in five agencies, nursing service directors in four agencies, medical records directors in five agencies, a staff nurse in one agency, and personnel director in one agency.

These agency representatives gathered the needed information from the agency's annual reports, then provided the necessary data to the investigator. The only exception was medical record data needed for the hospital survey. Data for the section "Health Care Clients" in the hospital were obtained from the Medical Record Department's annual ICD.9CM International Classification of Diseases, Clinical Modification (9th revision) File and Emergency Record Book in five hospitals and from patient admission records in two hospitals. In four of the hospitals, the Medical Records Director, the Nursing Service Director, and the investigator worked together to collect these statistics. In one hospital, the Medical Records Staff gathered the needed data.

The time required to complete the survey data varied depending on the agency's organization and retrieval systems.

Agency Representative Interviews

During the investigator's initial meeting with the administrator or the administrator's designate, the investigator asked for names of individuals who had been employed in the agency during the energy impact cycle. At that time, the administrator or his designate (1) provided the names of agency representatives who agreed to be interviewed and (2) made arrangements for the investigator to meet each agency representative.

When the investigator met the agency representative(s) for interview the following points were discussed:

(1) Purpose of the study.

(2) Procedures involved in the study, such as type of data needed and length of time for interview.

(3) Participation in the study was voluntary.

(4) Study participants had the freedom to withdraw from the study at any time.

(5) Each community, each acute health care agency, and each participating agency representative would be given a code number in lieu of their name.

(6) The privacy and confidentiality of the interview data would be protected.

(7) All information obtained from the interview would be kept under lock and key.

(8) Any information that was obtained in connection with the study and could be identified with the agency or agency representative would be disclosed only with their permission.

(9) A summary of the study would be given to the administrator of the acute health care agency upon completion of the study.

(10) Participants would be given a copy of the consent form for their future reference.

After these points were covered, the informed consent was offerd and signed. The investigator then conducted the interview using the agency representative interview questionnaire.

In a majority of the acute health care agencies, the high turnover in employment affected the number of individuals available for interview. As a result, the agency representatives interviewed represented a wide variety of roles. They included the following:

Emergency Medical Service- director in four agencies and attendants in four agencies;

Health Care Provider Offices - physician in thirteen offices, receptionist in one office, registered nurse in one office, medical technologist in one office and administrator in one office;

Hospital - administrator in five agencies, nursing service director in four agencies, staff nurses in five agencies, pharmacist in one agency, housekeeping director in one agency, personnel director in one agency, and central supply director in one agency.

Interviews with agency representatives were from twenty to ninety minutes in length. The time varied depending on the number of roles assumed by the agency representative. For instance, it was common for the hospital administrator to have roles of administrator, budget officer, personnel director, and public relations officer. In some instances, the agency representative participated in both the collection of survey data and the interview.

Community Resident Interviews

Interviews were conducted with ten community residents in each community. The number and type of residents to interview in the study communities was determined from results of the pilot study. From the pilot study, the investigator found that interviews with more than ten community residents resulted in no new information about the changes in the acute health care delivery system, but rather in a repetition of responses from previous interviews. Interviews with community officials in the pilot study showed that individuals representing city government, the local newspaper, and the chamber of commerce were able to provide a broad overview of community changes throughout the most recent energy impact cycle.

In each community, the investigator interviewed an official from city government, the newspaper editor, and a chamber of commerce official. Otherwise interviews were randomly conducted with community residents in coffee shops, in stores, in acute health care agency waiting rooms, and on street corners. These interviews were from fifteen minutes to one hour in length.

When the investigator met with a community resident, the following points were covered:

(1) Purpose of the study.

(2) Participation in the study was voluntary.

(3) Participants would not be asked any personal information. Questions would pertain only to changes within the acute health care delivery system and the community.

(4) The privacy and confidentiality of interview data would be protected.

A consent from community residents was not obtained because no personal information was asked. The investigator then conducted the interview using the community resident interview questionnaire.

Data Analysis

Data were analyzed using descriptive statistics. Descriptive statistics are appropriate for this study because they can be used to "portray and synthesize data obtained from empirical measurements" (Polit and Hungler 1978).

The survey data obtained from the emergency medical services, the health care provider offices and the hospitals were analyzed in a two-step process. First, the procedure called FREQUENCIES from the Statistical Package for the Social Sciences was used to produce measures of frequency distribution and central tendency for the study variables of health manpower resources, operational status, physical infrastructures, and health care clients (Nie et al. 1975). Information from this statistical package was used to characterize the variables in each acute health care agency and to combine like variables from the acute health care agencies. Second, the percentage of change from pre-impact to impact, impact to post-impact, and pre-impact to post-impact was calculated for each variable.

In analyzing the data obtained through interviews, a frequency count of response items was performed. First, frequencies were calculated for the participant responses which corresponded with responses on the interview questionnaire and response recording form. Then, a post hoc content analysis was performed on participant comments that did not correspond with responses on the Interview Questionnaire and Response Recording Form. Once the content analysis was finished, these responses were also analyzed by a frequency count.

Summary

In this chapter the following methods were identified: the design, the sample selection process, the instrumentation, the procedures, and the data analysis techniques. The remaining three chapters are used to (1) present the findings of data analysis (Chapter IV), (2) discuss the findings (Chapter V), and (3) summarize the study (Chapter VI).

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CHAPTER IV

DATA ANALYSIS

The results of data analysis are presented in the following order: characteristics of the study communities, analysis of survey data, and analysis of interview data. The interview data are presented by agency representative interviews and community resident interviews.

Characteristics of Study Communities

The five study communities are described by the five criteria used for their selection. These criteria are presented by population, location, acute health care agencies, experience with the energy impact cycle because of oil and gas activities, and experience with other energy activities.

Population

Data obtained from the U.S. Census Bureau showed that the five communities' 1970 populations ranged from 2,300 to 7,500 with a mean population of 4,084. By 1980, their populations ranged from 3,400 to 9,200 with a mean population of 5,380. The population growth between 1970 and 1980 represented increases ranging from 23 to 52 percent.

Since the communities did not conduct a special census during the energy impact cycle, it is difficult to determine how much population change occurred in each community. Officials in each community used the 1980 U.S. Census data to calculate population changes that occurred between pre-impact (1978 for one community and 1979 for four communities) and impact (1981 for four communities and 1982 for one community). These community officials estimated that with impact the communities experienced population increases ranging from 12 to 153 percent. For all communities the annual percentage increase between 1980 and impact was greater than their annual percentage population increase between 1970 and 1980. See Table 4.1.

The post-impact year was identified as 1983 for all five communities. Officials in each community reported major population declines with post-impact. Their estimates ranged from a decline of 5 to 47 percent for their specific community. For every community the average annual percent of decline with post-impact was not nearly as large as the annual percent of increase with impact.

Population Changes In Five Selected Rural Energy Impact Communities In Texas

Community	% Change 1970-1980[1]	Estimated % Change 1980-Impact[2]	Estimated % Change Impact-Post-Impact[2]	Impact Year	Post-Impact Year	Average Annual Percent Change 1970-1980[1]	Estimated Average Annual Percent Change 1980-impact[2]	Estimated Average Annual Percent Change Impact-Post-Impact[2]
1	+37%	+12%	-9%	1981	1983	+3.7%	+12%	-4.5%
2	+42%	+153%	-47%	1981	1983	+4.2%	+153%	-23.5%
3	+23%	+21%	-5%	1981	1983	+2.3%	+21%	-2.5%
4	+52%	+72%	-25%	1982	1983	+5.2%	+36%	-25%
5	+28%	+16%	-15%	1981	1983	+2.8%	+16%	-7.5%

Source:

1 U.S. Census Bureau. General Population Characteristics of Texas, 1970, 1980.

2 Data from mayors and/or city managers.

Table 4.1

Location

The distance from the study communities to the closest city of fifty thousand or more population ranged from fifty-four to ninety-three miles with an average distance of seventy-two miles. The 1980 populations for these cities of over fifty thousand ranged from 73,000 to 345,496. Three of the study communities were closest to cities with populations between fifty thousand and 100,000. For the other two communities, the nearest cities had populations of 149,000 and 345,496 respectively.

Acute Health Care Agencies

There were one emergency medical service, one hospital, and two to five health care provider offices in each community. The number of emergency medical services and hospitals did not change during the energy impact cycle in any community. With impact and again with post-impact, the number of health care provider offices increased in four of the study communities. One community did not have an increase in the number of health care provider offices during the energy impact cycle.

Experience With the Energy Impact Cycle Because of Oil and Gas Activities

The five communities represented diverse histories of local oil and gas activities. Oil and gas were first discovered in these five communities in 1887, 1923, 1950, 1960, and 1973 respectively. Since the discovery of oil and gas, the communities had experienced the energy impact cycle approximately every seven to eight years.

For all the communities, the most recent energy impact cycle began in the late seventies. Oil and gas activities reached their highest peak in the early eighties and then suddenly dropped in 1983. Rig counts and employee statistics support the growth and decline in oil and gas activities. See Table 4.2.

From the pre-impact to the impact stage, the communities experienced a rise in rig counts ranging from 37.5 percent (eighteen rigs) to 183 percent (forty-four rigs). During this same time period, the increase in the number of energy employees ranged from 33.5 percent (162 employees) to 971.5 percent (1,778 employees).

Changes In Oil And Gas Activities Of Five Selected
Rural Energy Impact Communities In Texas
During The Energy Impact Cycle

Community Number	Rig Counts[1]		Mining Employees[2]	
	% Change Pre-Impact -- Impact	% Change Impact-- Post-Impact	% Change Pre-Impact -- Impact	% Change Impact-- Post-Impact
1	+78%	-35.9%	+33.5%	+3%
2	+139.3%	-57.8%	+971.5%	-56.8%
3	+74.5%	-21.3%	+41%	-6.3%
4	+37.5%	-27.2%	+34.5%	-29.9%
5	+183.5%	-69.1%	+44.7%	-25.3%

Source:

1 Hughes Tool Company. Annual Rig Counts, 1978-1983.

2 Texas Employment Commission. Quarterly Report on Labor Force in Texas Counties, 1978-1983.

Table 43[2]

With post-impact, both the rig counts and the numbers of energy employees declined in the communities. The decrease in rig counts ranged from 21 percent (nineteen rigs) to 69 percent (forty-seven rigs). In four communities there was a decline in the number of energy employees ranging from 6.3 percent (119 employees) to 56.8 percent (1,114 employees). In the fifth community, there was a decrease in the number of energy employees of 11.6 percent during the first three quarters of 1983, the post-impact year, and an increase in the number of energy employees of 3 percent over the impact during the fourth quarter of 1983. This increase in the number of energy employees occurred because local service companies assumed responsibility for oil and gas wells previously serviced by oil and gas companies that went bankrupt during post-impact.

Experience With Other Types of Energy Activity

For each of the study communities, the only experience with the energy impact cycle had been because of oil and gas activities. Three of the communities were located in regions where the only energy activity that had ever occurred was oil and gas related. The other two communities were located sixty-three and seventy-one miles respectively from coal mining operations in their regions. In both of these communities, officials stated that community residents were not involved with the coal plants. This is consistent with findings from two studies about Texas coal communities. Murdock et al. (1980) found that 81 percent of workers commuting to coal operations traveled less than thirty miles. Van Sandt et al. (1982) provides additional support, reporting that 91 percent of the coal workers reside within a thirty-mile radius of the worksite.

Summary

The study communities met the criteria established for sample selection. These communities possessed similar characteristics in that (1) their 1970 and 1980 populations were under 10,000, (2) they were located more than fifty miles from cities with populations of over fifty thousand, (3) they had one hospital, one emergency medical service, and several health care provider offices, (4) they had experienced the energy impact cycle in the past decade because of oil and gas activities, and (5) they had not experienced any other type of energy activity in the past decade.

Analysis of Survey Data

The analysis of survey data is presented in two parts. First, the acute health care agencies are characterized. Then the survey data are discussed by changes which occurred in the health manpower resources, operational status, physical infrastructures, and health care clients during the energy impact cycle.

Characteristics of Acute Health Care Agencies

The acute health care agencies are discussed by emergency medical services, health care provider offices, and hospitals. Each of the acute care agencies is characterized by location, size, type, and ownership.

Emergency Medical Services

A total of five emergency medical services were surveyed. Each participating emergency medical service was located in a different study community.

Location

During the most recent energy impact cycle, three of the five emergency medical services were the only ambulance providers in their county. Often, these emergency medical services also provided ambulance service for portions of adjacent counties. The fourth emergency medical service provided ambulance service to only two thirds of its county because there were two other emergency medical services located in the county. The fifth emergency medical service provided ambulance service to the entire county during pre-impact and part of impact. The service area of the fifth emergency medical service changed during impact because another emergency medical service was initiated in a remote area of the county to accommodate the county's growing service needs.

For all the emergency medical services, the service area ranged from several hundred to several thousand miles. The largest reported service area was two thousand square miles. In spite of the large service areas, the distance between the participating emergency medical services and the nearest emergency medical service was eighteen miles for one agency, thirty miles for three agencies, and forty miles for one agency.

Size

The size of the emergency medical services varied with regard to the number of ambulances and number of employees. Two of the emergency medical services had two ambulances, one ice had three ambulances, and two had four ambulances. Two of the agencies had only salaried, full-time attendants on staff. In both cases, the number of salaried employees was less than six. The other three agencies had only one to three full-time attendants and relied on volunteer attendants to provide services. The number of attendants varied during the energy impact cycle, with two of the emergency medical services consistently having from ten to eighteen attendants and three having fewer than ten attendants.

Type

All of the participating emergency medical services were certified to provide basic life support services. None were classified as advanced life support providers.

Ownership

A majority (N=4) of the emergency medical services in the study communities were owned by the county in which they were located. However, three of these county-owned emergency medical services received community subsidies. Two of the county-owned emergency medical services were operated through the fire department and two were operated through the county hospital. The fifth emergency medical service had no county affiliation. Rather, it was privately owned and received a subsidy from the community in which it was located.

Health Care Provider Offices

A total of seventeen health care provider offices were surveyed. A breakdown by community shows that there were two health care provider offices in one community, three in two communities, four in one community and five in one community. The number of health care provider offices increased by one in two communities and by three in two communities during the impact stage of the energy impact cycle. One community did not experience a change in the number of health care provider offices during the energy impact cycle.

Location

The service areas for the health care provider offices were not as extensive as those of the emergency medical services or the hospitals because there were usually health care provider offices located in other communities within the county. The distance between the health care provider offices in the study community and the nearest health care provider offices to the study communities ranged from ten to forty miles.

Size

The health care provider offices ranged in size from one physician to four physicians during the energy impact cycle. The number of employees, including physicians, consistently remained under seven for fourteen of the health care provider offices, between seven and ten for one, and between fourteen and twenty for two.

Type

A majority of the health care provider offices were classified as general or family practice offices. Other health care provider offices specialized in surgery, internal medicine, and allergy control practices.

Ownership

Eight of the health care provider offices were solo practices located in single office buildings, eight were solo practices located in medical clinic complexes, and one was a group practice located in a medical clinic complex.

Hospitals

A total of five hospitals were surveyed. Each participating hospital was located in a different study community.

Location

Four of the five hospitals were the only hospitals in their counties. The fifth hospital was located in a county that had two hospitals. Overall, the hospitals' service areas were as large as those reported for the emergency medical services. The distance between the hospitals in the study communities and the nearest hospital to the study communities was twenty to twenty-five

miles for two of the hospitals and forty to fifty miles for three of the hospitals. In all cases, the hospitals provided services to residents of several counties.

Size

In terms of bed capacity and numbers of employees, the hospitals could all be considered small rural hospitals. All of them had fewer than fifty beds. A breakdown of hospitals by bed capacity shows that two hospitals had between twenty-five and twenty-nine beds, two hospitals had between thirty and thirty-nine beds, and one hospital had forty-nine beds. By numbers of employees, the hospitals varied during the energy impact cycle, with one hospital having between thirty and forty employees, two hospitals having between fifty and seventy employees, and two hospitals having between eighty-five and 125 employees.

Type

The Texas Department of Health classified all the hospitals as as general, short-term facilities that provided medical, surgical, obstetric, and emergency services. Four of the hospitals were also classified as providing pediatric services and one hospital was classified as providing mixed intensive care services.

All of the hospitals were licensed by the Texas Department of Health, but none were accredited by the Joint Commission on Accreditation of Hospitals.

Ownership

The hospitals were dissimilar in ownership arrangements. During the energy impact cycle the following ownership arrangements existed for four of the hospitals: one was owned by a non-profit corporation, one was owned by the city, one was owned by the county, and one was owned by a hospital district. The fifth hospital was operated by the county during pre-impact and impact, but was changed to a hospital district during post-impact. The change occurred so that the hospital could benefit from the increased amount of tax money coming into the community.

Summary

In all of the study communities, the emergency medical services, the health care provider offices, and the hospitals provided general acute health care services. The service areas for the acute health care agencies were extensive because most of these agencies were the only providers of their kind within the county. All of the agencies were relatively small, with each of the emergency medical services having fewer than five ambulances, the health care provider offices having fewer than four doctors, and the hospitals having fewer than fifty beds. The major difference among the acute health care agencies was in ownership arrangements. A majority of the emergency medical services were county-owned. Most of the health care provider offices were privately owned, solo practices. The hospitals were owned by either the county, the city, a corporation, or a hospital district.

Changes In The Acute Health Care Delivery Systems As Indicated By Survey Data

Survey data were collected from the emergency medical services, the health care provider offices, and the hospitals in five rural energy impact communities to determine what changes occurred in the acute health care delivery systems during the energy impact cycle. Changes in the acute health care delivery system, are reported by the following categories: health manpower resources, operational status, physical infrastructures, and health care clients.

Changes In The Health Manpower Resources

The total number of health manpower resources in the acute health care delivery systems increased during the most recent energy impact cycle (Table 4.3). Between pre-impact and impact, the number of health manpower resources increased by 18 percent (N=78). A breakdown by acute health care agency shows that between pre-impact and impact the number of health manpower resources increased by 41 percent (N=28) in the health care provider offices, 19 percent (N=8) in the emergency medical services, and 13 percent (N=42) in the hospitals. During post-impact, the number of health manpower resources increased over impact levels by 6 percent (N=21) in the hospitals and 3 percent (N=3) in the health care provider offices. In the emergency medical services, the number of health manpower resources decreased by 16 percent (N=8).

Changes In The Number Of Health Manpower Resources During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Number of Health Manpower Resources			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Emergency Medical Services	43	51	43	+8	-8	0	+19	-16	0
Health Care Provider Offices	69	97	100	+28	+3	+31	+41	+3	+45
Hospitals	330	372	393	+42	+21	+63	+13	+6	+19
TOTAL	442	520	536	+78	+16	+94	+18	+7	+21

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Table 4.3

Between pre-impact and post-impact, the number of health manpower resources in the acute health care agencies increased by 21 percent (N=94). This overall increase in the number of health manpower resources occurred because more health manpower resources were employed by the health care provider offices and the hospitals during post-impact than during pre-impact. Once impact was over, the number of health manpower resources associated with the emergency medical services returned to pre-impact levels.

Specific changes that occurred in the number of health manpower resources are discussed by the following four categories: physicians, nursing staff, allied health staff, and emergency medical attendants.

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Physicians

During the energy impact cycle the number of physicians increased by 11 percent (N=4) during impact and 21 percent (N=6) during post-impact (Table 4.4). With impact, the largest increase occurred in the number of physicians associated with health care provider offices. As post-impact occurred, the number of physicians remained the same in the health care provider offices, but continued to increase in the hospitals.

A breakdown by physician specialty (Table 4.5) shows that during impact the largest increase occurred in the number of general/family practitioners. With post-impact, a variety of specialists came into the study communities either to set up practices or to serve as consultants to local physicians. By specialty, physicians establishing practices in the local communities included an emergency medicine practitioner, two surgeons, and a radiologist. Consulting physicians by specialty included a cardiologist, an obstetrician/gynecologist, a pathologist, a pediatrician, and a surgeon.

A comparison between pre-impact and post-impact shows that during post-impact there were more physicians in the study communities. By specialty, there were more surgeons, radiologists, internists, general/family practitioners, and emergency medicine practitioners practicing in the study communities during post-impact than during pre-impact.

Nursing Staff

Overall, nursing staff, including registered nurses, licensed vocational nurses, and nursing assistants, increased during the energy impact cycle (Table 4.6). The largest increase in nursing staff (19 percent, N=32) oc-

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Changes In The Number Of Physicians During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Number of Health Manpower Resources			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	16	21	21	+5	0	+5	+31	0	+1
Hospitals (Active Physicians)	21	25	27	+4	+2	+6	+19	+8	+29
Hospitals (Consultant Physicians)	14	14	20	0	+6	+6	0	+43	+43
TOTAL	35	39	47	+4	+6	+12	+11	+21	+34

Table 4.4

Changes In The Number Of Physicians By Specialty During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Specialty of Physician	Number of Physicians by Specialty			Amount of Change			Percent Change		
		Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	General/Family Practice	13	17	17	+4	0	+4	+31	0	+31
	Internist	-	1	.5	+1	-.5	+.5	+100	-50	+50
	Surgeon	2	2	2	0	0	0	0	0	0
	Allergist	1	1	1	0	0	0	0	0	0
Hospitals	Allergist	1	1	1	0	0	0	0	0	0
	Cardiologist Consultant	1	1	2	0	+1	+1	0	+100	+100
	Emergency Medicine Active	-	-	1	0	+1	+1	0	+100	+100
	Emergency Medicine Consultant	1	1	1	0	0	0	0	0	0
	General/Family Practice Active	16	19	19	+3	0	+3	+19	0	+19
	General/Family Practice Consultant	2	2	2	0	0	0	0	0	0
	Internist Active	-	1	1	+1	0	+1	+100	0	+100
	Internist Consultant	1	1	1	0	0	0	0	0	0
	Obstetrician/Gynecologist Active	1	1	1	0	0	0	0	0	0
	Obstetrician/Gynecologist Consultant	-	-	1	0	+1	+1	0	+100	+100
	Pathologist Consultant	3	3	4	0	+1	+1	0	+33	+33
	Podiatrician Consultant	-	-	1	0	+1	+1	0	+100	+100
	Radiologist Active	-	-	1	0	+1	+1	0	+100	+100
	Radiologist Consultant	3	3	3	0	0	0	0	0	0
	Surgeon Active	3	3	5	0	+2	+2	0	+67	+67
	Surgeon Consultant	1	1	2	0	+1	+1	0	+100	+100

Table 4.5

Changes In The Number Of Nursing Staff (RNs, LVNs, and Nursing Aides)
During The Energy Impact Cycle In Five Selected
Rural Energy Impact Communities In Texas

	Number of Nursing Staff (RN, LVN, Nursing Aides)			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	19	26	23	+7	-3	+4	+37	-12	+21
Hospitals	150	175	183	+22	+8	+33	+17	+5	+22
TOTAL	169	201	206	+32	+5	+37	+19	+2	+22

Table 4.6

curred during impact. In hospitals, the number of nursing staff increased by 17 percent (N=22), while the health care provider offices' nursing staff increased by 37 percent (N=7). During post-impact the number of nursing staff continued to increase in the hospitals (5 percent, N=8). With post-impact, the number of nursing staff employed in the health care provider offices declined by 12 percent (N=3). A comparison between pre-impact and post-impact shows that during post-impact there were more nursing staff in both the health care provider offices and the hospitals.

During impact, the number of licensed vocational nurses increased the most (Table 4.7), followed by nursing assistants (Table 4.8), then registered nurses (Table 4.9). With post-impact the number of licensed vocational nurses and registered nurses exceeded impact levels by 23 percent (N=18) and 8 percent (N=3) respectively, while the number of nursing assistants declined by 19 percent (N=16).

The largest increase between pre-impact and post-impact occurred in the number of licensed vocational nurses (51 percent, N=32), followed by registered nurses (24 percent, N=8). Between pre-impact and post-impact, the number of nursing assistants declined by 4 percent (N=3).

Allied Health Staff

The number of allied health staff increased during the energy impact cycle (Table 4.10). Overall, the largest increase in the number of allied health staff occurred during impact, with a 36 percent (N=4) increase in the health care provider offices' staff and a 35 percent (N=17) increase in the hospitals' staff. The agencies experienced diverse changes in the number of allied health staff during post-impact, when the health care provider offices experienced an increase of 40 percent (N=6) but the hospitals experienced a decrease of 5 percent (N=3). For both agencies the number of allied health staff during post-impact was substantially increased from pre-impact levels.

A breakdown of allied health staff by specialty reveals that changes occurred during the energy impact cycle in both the health care provider offices and the hospitals (Table 4.11). In the health care provider offices, there were increases during impact in the number of medical records, laboratory, and radiology staff. The only area to experience a change in number of employees during post-impact was the laboratory.

Changes In The Number Of LVNs During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Number of LVNs			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	16	20	19	+4	-1	+3	+2	-5	+19
Hospitals	47	57	76	+10	+19	+29	+21	+33	+62
TOTAL	63	77	95	+14	+18	+32	+22	+23	+51

Table 4.7

Changes In The Number Of Nursing Aides During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Number of Nursing Aides			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	2	4	3	+2	-1	+1	+100	-25	+50
Hospitals	70	81	66	+11	-15	-4	+16	-19	-6
TOTAL	72	85	69	+13	-16	-3	+18	-19	-4

Table 4.8

Changes In The Number Of RNs During The Energy Impact Cycle
In Five Selected Rural Energy Impact Communities In Texas

	Number of RNs			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	1	2	1	+1	-1	0	+100	-50	0
Hospitals	33	37	41	+4	+4	+8	+12	+11	+24
TOTAL	34	39	42	+5	+3	+8	+15	+8	+24

Table 4.9

Changes In The Number Of Allied Health Staff During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Number of Allied Health Staff			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	11	15	21	+4	+6	+10	+36	+40	+91
Hospitals	48	65	62	+17	-3	+14	+35	-5	+29
TOTAL	59	80	83	+21	+3	+24	+36	+4	+41

Table 4.10

Changes In The Number Of Allied Health Staff During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Specialty	Number of Allied Health Staff			Amount of Change			Percent Change		
		Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Health Care Provider Offices	Laboratory staff	4	6	11	+2	+5	+7	+50	+83	+175
	Medical Records staff	4	8	8	+4	0	+4	+100	0	+100
	Radiology staff	3	4	4	+1	0	+1	+33	0	+33
Hospitals	Dieticians	3	1	2	-2	+1	-1	-67	+100	-33
	Dietary staff	10	14	14	+4	0	+4	+40	0	+40
	Dietary contract services	1	4	3	+3	-1	+2	+300	-25	+200
	Medical Records/Administration & staff	4	10	8	+6	-2	+4	+150	-20	+100
	Medical Records contract services	-	1	1	+1	0	+1	+100	0	+100
	Medical Technologists/ Lab staff	9	11	10	+2	-1	+2	+22	-9	+25
	Lab contract services	-	1	-	+1	-1	0	+100	-100	0
	Pharmacists	3	3	2	+0	-1	-1	0	-33	-33
	Pharmacy staff	1	5	5	+4	0	+4	+400	0	+400
	Pharmacy contract services	4	2	3	-2	+1	-1	-50	+50	-25
	Physical Therapists	1	1	1	0	0	0	0	0	0
	Physical Therapy staff	-	-	1	0	+1	+1	0	+100	+100
	Physical Therapy contract services	-	2	1	+2	-1	+1	+200	-100	+100
	Respiratory Therapists/staff	3	6	5	+1	-1	0	+20	-17	0
	Respiratory Therapy contract services	1	1	2	0	+1	+1	0	+100	+100
	Radiology Technicians	6	7	8	+1	+1	+2	+17	+14	+33
	Radiology staff	1	-	-	-1	0	-1	-100	0	-100
	Radiology contract services	1	2	-	+1	-2	-1	+100	-200	-100

Table 4.11

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In the hospital, the largest changes occurred during impact. At that time there were a declining number of dieticians, an increasing number of staff in pharmacy, medical records, dietary, and the laboratory, and an increasing number of contract services for dietary and physical therapy. During post-impact increases were noted in the number of dieticians, radiology technicians, physical therapy staff, pharmacy contract services, and respiratory therapy contract services. Some reductions occurred in medical records staff, laboratory staff, respiratory therapy staff, the number of pharmacists, and the number of contract services for radiology, physical therapy, the laboratory, and dietary.

From pre-impact to post-impact, increases occurred in almost all of the allied health specialty areas. In the health care provider offices, increases occurred in the number of laboratory (175 percent, N=7), medical records (100 percent, N=4), and radiology (33 percent, N=1) staff. For the hospitals, increases occurred in every specialty area except the number of dieticians (33 percent, N=1), pharmacists (33 percent, N=1), radiology staff (100 percent, N=1), pharmacy contract services (25 percent, N=1) and radiology contract services (100 percent, N=1).

Emergency Medical Attendants

The emergency medical attendants were unlike other groups of health manpower resources in that their numbers did not increase during both impact and post-impact (Table 4.12). Instead, the number of emergency medical attendants increased 19 percent (N=8) during impact, but decreased 16 percent (N=8) during post-impact. Consequently, the post-impact number of attendants was exactly the same as the pre-impact level.

The greatest change in the emergency medical attendants' certification level[1] occurred during impact. At that time, the number of first aid certified attendants declined 60 percent (N=3), while the number of emergency medical technicians (37 percent, N=7) and emergency certified attendants (21 percent, N=4) increased. Corresponding with the decline in the number of attendants during post-impact were decreases in the numbers of emergency certified attendants (21 percent, N=4) and first aid certified attendants (50

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[1] The certification levels of emergency medical attendants from lowest to highest are: First Aid Certified Attendant, Emergency Care Attendant, Emergency Medical Technician, Emergency Medical Technician with Special Skills, and Paramedic.

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Changes In The Number Of Emergency Medical Services Attendants During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

EMS Attendants By Certification Level	Number of EMS Attendants			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
First Aid Certified	5	2	1	-3	-1	-4	-60	-50	-20
Emergency Certified	19	23	15	+14	-8	-4	+21	-35	-21
Emergency Medical Technician	19	26	27	+7	+1	+6	+37	+4	+32
TOTAL	43	51	43	+8	-8	0	+19	-16	0

Table 4.12

percent, N=1). However, the number of emergency medical technicians continued to increase during post-impact (4 percent, N=1), as it had throughout the energy impact cycle (32 percent, N=6). During the energy impact cycle none of the emergency medical attendants were certified as emergency medical technicians with special skills or as paramedics.

Changes In The Operational Status

Changes occurred in the operational status of the acute health care delivery systems during the energy impact cycle. These changes are reported by finances and utilization.

Finances

During the energy impact cycle changes occurred in the percentage of gross income that the agencies used for overhead and in the agencies' collection rates (Table 4.13). Both the emergency medical services and the health care provider offices used a greater percentage of their gross earnings for overhead during impact than during pre-impact. With post-impact, both of these agencies showed a decrease in the amount of gross income they used for overhead. In contrast, the hospitals used less of their gross income for overhead during impact and more of their gross income for overhead during post-impact. A comparison of the agencies reveals that they used a greater amount of their gross incomes for overhead during post-impact than during pre-impact.

For all of the agencies, the percentage of collection declined during impact. This trend of declining collection rates continued into post-impact for the emergency medical services and the hospitals. In the health care provider offices the collection rate was greater during post-impact than it had been during either pre-impact or impact.

Utilization

Overall, the acute health care agencies experienced fluctuating utilization levels during the energy impact cycle (Table 4.14). During impact, the agencies' level of utilization drastically increased (60 percent), and during post-impact it decreased slightly (13 percent). Overall, the agencies' level of utilization was greater during post-impact than during pre-impact.

A breakdown of utilization rates by agency shows marked differences among the acute health care agencies. Specific changes that occurred in the utili-

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Changes In Finances During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Finances	Average Percent			Amount of Change			Percent Change		
		Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Emergency Medical Services	Gross for Overhead	67.5	80.7	79.0	+13.2	-1.7	+11.5	+20	-2	+17
	Collection	95.5	89.7	86.0	-5.8	-3.7	-9.5	-6	-4	-10
Health Care Provider Offices	Gross for Overhead	49.0	55.0	51.0	+6.0	-4.0	+2.0	+12	-7	+4
	Collection	82.0	80.0	87.0	-2.0	+7.0	+5.0	-1	+9	+6
Hospitals	Gross for Overhead	95.5	94.0	96.0	-1.5	+2.0	+0.5	-2	+2	+1
	Collection	91.0	88.5	86.0	-2.5	-1.5	-5.0	-3	-3	-5

Table 4.13

Changes In Utilization Of Acute Health Care Delivery Services During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Utilization Numbers			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Emergency Medical Services	1,250	2,348	2,200	+1,098	-148	+950	+88	-6	+76
Health Care Provider Offices	86,220	142,310	123,208	+56,090	-19,102	+36,988	+65	-13	+43
Hospitals: In-Patient Admissions	7,453	7,742	7,282	+289	-460	-171	+4	-6	-2
TOTAL	95,223	152,400	132,713	+57,177	-19,687	+37,490	+60	-13	+39

Table 4.14

zation of the emergency medical services, the health care provider offices, and the hospitals are detailed below.

Emergency Medical Services. The emergency medical services' utilization rate increased during impact, but decreased during post-impact (Table 4.15). A comparison between the utilization rates for pre-impact and post-impact shows that the utilization rate during post-impact was considerably higher than during pre-impact.

Corresponding with the fluctuating level of utilization was the number of ambulance transfers out of the communities. During impact the number of transfers to major medical centers increased by 200 percent (N=464) over pre-impact levels. With post-impact, the number of ambulance transfers was lower than impact levels but higher than pre-impact levels.

The major reasons for ambulance transfers out of the communities during the energy impact cycle included major trauma, cardiac complications, cancer treatment, medical emergencies, and burns. The primary recipient sites for ambulance transfers were located forty to sixty-nine miles away from two of the study communities, seventy to ninety-nine miles from one of the communities, and over one hundred miles from two of the communities.

Health Care Provider Offices. The utilization rates of health care provider offices increased during impact and decreased during post-impact (Table 4.14). Overall, the health care provider offices' utilization rate was higher post-impact than pre-impact.

Hospitals. During the energy impact cycle the hospitals' utilization rate for patient admissions steadily declined (Table 4.14). Accompanying the declining admission rate during impact were decreases in the hospitals' average occupancy rate and their average daily census (Table 4.16). Even though the number of patient admissions continued to decline during post-impact, the average occupancy rate increased slightly (2 percent).

The overall decline in patient admissions during the energy impact cycle did not affect all the service areas (Table 4.17). With impact, admissions increased in obstetrics by 24 percent (N=213), pediatrics by 24 percent (N=110), and intensive care by 2000 percent (N=20). During post-impact every service area except for the intensive care units showed a decline in admis-

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Changes In Utilization Of Emergency Medical Services During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

EMS Services	EMS Utilization Numbers			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Runs	1,250	2,348	2,200	+1,098	-148	+950	+88	-6	+76
Transfers out of the community	232	696	554	+464	-142	+322	+200	-20	+139

Table 4.15

Changes In Utilization Of Hospital In-Patient Services During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

Hospital In-Patient Utilization	Average Hospital In-Patient Utilization			Average Amount of Change			Average Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Average occupancy rate	53	50	51	-3	+1	-2	-6	+2	-4
Average daily census	95	93	88	-2	-5	-7	-2	-5	-7

Table 4.16

Changes In Utilization Of Hospital In-Patient Services During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

Hospital Service Areas	Hospital In-Patient Utilization Numbers			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Medical/surgical	6,122	6,088	5,947	-34	-141	-175	-1	-2	-3
Obstetrics	874	1,087	947	+213	-140	+73	+24	-13	+9
Pediatrics	457	567	388	+110	-179	-69	+24	-32	-15
ICU	-	20	43	+20	+23	+43	+2,000	+115	+4,300
TOTAL	7,453	7,762	7,282	+289	-460	-171	+4	-6	-2

Table 4.17

sions. Admissions to the medical/surgical areas paralleled overall patient admissions, with a consistent decline throughout the energy impact cycle.

The utilization rates varied within the service areas (Table 4.18). For instance, the number of deliveries and surgeries increased during impact and post-impact, but the number of emergency room visits increased during impact and decreased during post-impact. Overall, the numbers of deliveries, surgeries, and emergency room visits were higher during post-impact than during pre-impact.

The number of procedures done in the allied health service areas of laboratory, physical therapy, radiology, and respiratory therapy increased during both impact and post-impact (Table 4.19). Overall, the largest increases occurred during impact in the number of clinical laboratory procedures, and during post-impact in the number of respiratory therapy and physical therapy procedures. Overall, more procedures were done during post-impact than during pre-impact.

During impact, more in-patient procedures were done in the laboratory, physical therapy, and respiratory therapy areas, but fewer procedures were done in the radiology areas. With post-impact, the number of in-patient procedures increased in all of the areas, especially in respiratory therapy and physical therapy.

Although the number of procedures done on an out-patient basis increased during impact, even larger increases occurred during post-impact. The largest increase in out-patient procedures occurred in the number of physical therapy procedures done during impact and in the number of clinical laboratory procedures done during post-impact.

Changes In The Physical Infrastructures

Survey data on physical infrastructures were collected from hospitals only because data on the emergency medical services and the health care provider offices could be more readily provided by agency representatives during the interviews. Few changes occurred in the bed capacity of the hospitals during the energy impact cycle (Table 4.20). The only change occurred during post-impact, when the bed capacity declined by 4 percent (N=7). As a result, the number of hospital beds during post-impact was less than the number of hospital beds during pre-impact.

Changes In Hospital Utilization During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

Services	Utilization Numbers			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Emergency room visits	11,868	16,417	14,288	+4,549	-2,129	+2,420	+38	-13	+20
Surgeries	1,059	1,10[illegible]	1,497	+49	+389	+438	+5	+35	+41
Deliveries	766	1,000	839	+234	-161	+73	+31	-16	+10

Table 4.18

Changes In The Number Of Allied Health Procedures In Hospitals During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

Allied Health Service Areas		Number of Procedures			Amount of Change			Percent Change		
		Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Clinical laboratory	In-Patient	46,655	76,512	107,175	+29,857	+30,663	+60,520	+64	+40	+130
	Out-Patient	7,689	9,945	20,463	+2,256	+10,518	+12,774	+29	+106	+166
	Total	54,344	86,457	127,638	+32,113	+41,181	+73,294	+59	+48	+135
Physical therapy	In-Patient	1,577	2,324	5,408	+747	+3,084	+3,831	+47	+133	+243
	Out-Patient	1,734	2,473	3,913	+739	+1,440	+2,179	+43	+58	+126
	Total	3,311	4,797	9,321	+1,486	+4,524	+6,010	+45	+94	+182
Radiology	In-Patient	8,798	8,578	9,223	-220	+647	+427	-3	+8	+5
	Out-Patient	6,718	6,824	9,028	+106	+2,204	+2,310	+2	+32	+34
	Total	15,516	15,402	18,253	-114	+285	+2,737	-1	+19	+18
Respiratory therapy	In-Patient	11,921	17,384	52,476	+5,463	+35,092	+40,555	+46	+202	+340
	Out-Patient	341	454	634	+113	+180	+293	+33	+40	+86
	Total	12,262	17,838	53,110	+5,576	+35,272	+40,848	+45	+198	+333

Table 4.19

Changes In Hospital Bed Capacity During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

Hospital Service Areas	Number of Hospital Beds			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Medical/surgical	158	153	145	-5	-8	-13	-4	-5	-8
Obstetrics	13	13	15	0	+2	+2	0	+15	+15
Pediatrics	9	14	13	+5	-1	+4	+56	-7	+44
ICU	2	2	2	0	0	0	0	0	0
TOTAL BEDS	182	182	175	0	-7	-7	0	-4	-4

Table 4.20

A breakdown by service area indicates that during impact there were five fewer medical/surgical designated beds than during pre-impact. During post-impact the number of medical/surgical beds continued to decline (3 percent, N=13) along with a decline in the number of pediatric beds (7 percent, N=1). Only the number of obstetrics beds increased (15 percent, N=2) during post-impact. Overall, the hospitals had more obstetric and pediatric beds and fewer medical/surgical beds during post-impact as compared to pre-impact.

Changes In Health Care Clients

The changes in health care clients will be discussed by their condition for the emergency medical services, the health care provider offices, and the hospitals (Tables 4.21 and 4.22).

Emergency Medical Services

Major changes occurred in the level of emergency care, i.e., basic care, basic life support or advanced life support, the clients' condition required. Basic care was provided to clients who were stable and did not require immediate transfer to the hospital. Clients who required basic life support were considered high risk and needed immediate transfer to a hospital. Advanced life support was provided to clients who were unstable and needed immediate transfer to a hospital.

During impact, substantial increases occurred in the number of clients requiring basic care (124 percent, N=684), basic life support (99 percent, N=464), and advanced life support (180 percent, N=180). Increases occurred during post-impact only in the number of clients requiring basic care (6 percent, N=70). During post-impact, the numbers of clients who required basic care, basic life support and advanced life support exceeded those of pre-impact.

Of all the acute health care agencies, the emergency medical services experienced the largest increase in the number of clients with oil and gas related conditions during impact and the largest decrease during post-impact (Table 4.22). During impact the number of clients with oil and gas related conditions in all of the acute health care agencies increased by 331 percent (N=556). This number declined by 52 percent (N=378) during post-impact, but still exceeded pre-impact levels.

Changes In Health Care Clients During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Client Condition	Number of Clients by Condition			Amount of Change			Percent Change		
		Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Emergency Medical Services	Condition required basic care	550	1,234	1,284	+684	+70	+734	+124	+6	+137
	Condition required basic life support	470	934	768	+464	-166	+298	+99	-18	+63
	Condition required advanced life support	-	188	148	+188	-32	+148	+188	-18	+148
Health Care Provider Offices	Condition required routine care	66,699	96,331	87,270	+29,862	-9,251	+20,611	+45	-10	+31
	Condition required emergency care	11,791	18,499	11,250	+6,738	-7,251	-323	+57	-39	-4
Hospitals	Respiratory condition due to toxic fumes	2	7	6	+5	-1	+4	+250	-14	+200
	Low back pain	17	18	15	+1	-3	-2	+6	-17	-12
	Fractured ribs	33	24	28	-9	+4	-5	-27	+17	-15
	Fractured humerus	11	9	16	-2	+7	+5	-18	+78	+45
	Fractured wrist	31	12	36	-19	+24	+5	-61	+200	+16
	Sprained back or neck	113	109	99	-4	-10	-14	-4	-9	-12
	Concussion	67	62	83	-5	+19	+16	-7	+31	+24
	Scalp lacerations with head injury	23	20	20	+5	-0	-3	+22	-40	-13
	Eye burns	-	1	3	+1	+2	+3	+100	+200	+300
	Face burns	7	10	12	+3	+2	+5	+43	+20	+71
	Multiple burns	9	5	11	-4	+6	+2	-44	+120	+22
	Trunk burns	1	4	16	+2	+12	+14	+200	+400	+800
	Head burns	3	13	8	+10	-5	+5	+333	+38	+167
	Life threatening conditions in E.R.	1,049	2,440	2,507	+1,391	+67	+1,458	+133	+3	+139
	In-hospital deaths	174	156	183	-20	+29	+9	-1	+19	+5
	Out-of-hospital deaths brought to ER	14	24	28	+10	+4	+14	+71	+17	+100

Table 4.21

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Changes In The Number Of Clients With Oil/Gas Related Injuries During The Energy Impact Cycle In Five Selected Rural Energy Impact Communities In Texas

	Number of Clients with Oil/Gas Related Injuries			Amount of Change			Percent Change		
	Pre-Impact	Impact	Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact	Pre-Impact to Impact	Impact to Post-Impact	Pre-Impact to Post-Impact
Emergency Medical Services	168	724	346	+556	-378	+178	+331	-52	+106
Health Care Provider Offices	10,539	19,853	10,182	+9,314	-9,671	-357	+88	-49	-3
Hospital Emergency Rooms	1,484	4,451	3,973	+2,967	-478	+2,489	+200	-11	+168

Table 4.22

Health Care Provider Offices

The number of clients requiring both routine and emergency care at the health care provider offices changed during the energy impact cycle. During impact many more clients required routine care (45 percent, N=29,862) and emergency care (57 percent, N=6,728). With post-impact, the number of clients requiring emergency care dropped below pre-impact levels. The number of clients requiring routine care also declined during post-impact, but this number was greater than pre-impact levels (31 percent, N=20,611). Substantial increases were noted during impact (88 percent, N=9,314) in the number of clients who had an oil and gas related condition. During post-impact, the number of clients with oil and gas related conditions decreased (49 percent, N=9,671) to below pre-impact levels.

Hospitals

The hospitals' clients also changed during the energy impact cycle. A listing of clients by discharge diagnosis shows that during impact more clients had one or more of the following conditions than during pre-impact: respiratory problems due to toxic fumes, low back pain, scalp lacerations with head injury, eye burns, face burns, trunk burns, and hand burns. At the same time there were fewer clients with fractures or concussions.

During post-impact there were increases in the number of clients with fractured ribs, fractured humerus, fractured wrist, concussion, eye burns, face burns, and multiple burns. A declining number of clients had respiratory conditions due to toxic fumes, low back pain, sprained back or neck, and scalp lacerations with head injury.

Throughout the energy impact cycle, several patterns emerged. During impact, and again during post-impact, an increasing number of clients had some type of burn and a decreasing number of clients had sprained backs or necks. During post-impact, there were more clients who had respiratory conditions due to toxic fumes, concussions, fractures of the humerus or wrist, or burns of the eye, face, trunk, or hand as compared to pre-impact.

During impact an increasing number of clients were admitted to the emergency room with life threatening conditions (133 percent, N=1,391) or oil and gas related conditions (200 percent, N=2,967). With post-impact, there was a decline in the number of clients in the emergency room who had oil and gas related conditions (11 percent, N=478), but there were more clients with life

threatening conditions (3 percent, N=67). The post-impact level of clients with either life threatening conditions or oil and gas related conditions was higher than during pre-impact.

Overall, the number of client deaths increased during the energy impact cycle. The number of clients who were dead on arrival increased during impact (71 percent, N=10) and post-impact (17 percent, N=4). In-hospital deaths declined during impact (1 percent, N=20), but increased during post-impact (19 percent, N=29).

Summary Of Changes In The Acute Health Care Delivery Systems

The survey data show that changes occurred in the acute health care delivery systems' health manpower resources, operational status, physical infrastructures, and health care clients during both impact and post-impact. Overall, the largest changes occurred during impact.

The largest increase in the number of health manpower resources occurred between pre-impact and impact, with increases occurring in the numbers of physicians, nursing staff, allied health staff, and emergency medical attendants. With post-impact, there were increases in the numbers of physicians, nursing staff, and allied health staff, and decreases in the number of emergency medical attendants. Overall, there were more physicians, nursing staff, and allied health staff in the communities during post-impact than during pre-impact.

Changes in the operational status of acute health care agencies were noted in finances and utilization rates. Data on finances show that during post-impact, as compared to pre-impact, (1) the amount of gross income used by the agencies for overhead increased and (2) the collection rate decreased for the emergency medical services and hospitals and increased for the health care provider offices. The emergency medical services and the health care provider offices experienced substantial increases in utilization during impact, but decreases in utilization during post-impact. The hospitals' overall in-patient admission rate declined during the energy impact cycle, but during impact there were an increased number of admissions to obstetrics, pediatrics, intensive care, emergency room, and out-patient allied health areas and during post-impact to intensive care and out-patient allied health areas.

Changes in the physical infrastructures included (1) a decrease in the hospitals' bed capacity during post-impact, (2) a redesignation of

medical/surgical beds to pediatric beds during impact, and (3) a redesignation of medical/surgical beds to obstetrics beds during post-impact.

Changes in health care clients during the energy impact cycle included more of the clients in the agencies requiring general and emergency care during impact and fewer of the clients in the emergency medical services and the health care provider offices requiring general and emergency care during post-impact. In the hospitals, more clients required acute health care services during post-impact than during impact. In most instances, a greater number of health care clients were treated for conditions requiring basic/routine, emergency, or specialized care during post-impact than during pre-impact.

Analysis of Agency Representative Interviews

The analysis of agency representative interviews is presented in three parts. First, participants are characterized by employment and demographic data. Then the participants' comments on changes during the energy impact cycle in their communities and in their communities' acute health care delivery systems are discussed.

Characteristics of Agency Representative Participants

A total of 48 agency representatives were interviewed in the study communities. By agency, 42 percent (N=20) of the agency representatives worked in hospitals, 35 percent (N=17) worked in health care provider offices, and 23 percent (N=11) worked in emergency medical services.

Information was also obtained on what positions the agency representatives held in the acute health care agencies at the time of the interviews. In the emergency medical services, 36 percent (N=4) of the participants were directors and 64 percent (N=7) were attendants. By educational status, 82 percent (N=9) were emergency medical technicians and 18 percent (N=2) were emergency care attendants. In the health care provider offices, 76 percent (N=13) of the participants were physicians and the remaining 24 percent (N=1 for each) were administrators, registered nurses, receptionists, or laboratory technicians. In the hospital, 25 percent (N=5) of the participants were administrators, 20 percent (N=4) were nursing service directors, 35 percent (N=7) were staff nurses, and the remaining 20 percent (N=1 for each) were pharmacists, central supply directors, housekeepers, or personnel directors.

Data were also gathered about the number of years participants had been employed at the acute health care agencies. Their years of employment in the agencies were as follows: 2 percent (N=1) had been employed for less than two years, 38 percent (N=18) had been employed between two and six years, 25 percent (N=12) had been employed between six years and ten years, and 35 percent (N=17) had been employed for over ten years. A majority of the participants had worked in their agency during every stage of the energy impact cycle.

An additional breakdown of the forty-eight interviews shows that 60 percent (N=29) were held with men and 40 percent (N=19) were held with women. By age, 2 percent (N=1) of the participants were under twenty-five years, 50 percent (N=24) were between twenty-five and forty-four years, 44 percent (N=21) were between forty-five and sixty-five years, and 4 percent (N=2) were over sixty-five years. A characterization of the participants by race reveals that 81 percent (N=39) were Caucasian, 13 percent (N=6) were Hispanic, 2 percent (N=1) were Black, 2 percent (N=1) were Indian, and 2 percent (N=1) were Asian.

Changes In The Rural Energy Impact Communities As Identified By Agency Representatives

Participants were asked to identify how their communities changed from pre-impact ("before the oil and gas boom") to impact ("during the oil and gas boom"), and then to post-impact ("during the oil and gas bust or slowdown." Their responses about impact and post-impact are discussed by the categories identified in the "Changing Rural Community" of the conceptual framework (Figures 4.1 and 4.2).

Impact

Participants said that the growing level of industrialization, as indicated by an increasing number of oil drilling rigs, was the initial sign of impact (N=8). Otherwise, agency representatives did not mention any accompanying signs of expanding construction or expanding support services. However, they noted that an increasing number of oil and gas related jobs became available (N=38).

A majority of the agency representatives' comments were about the growing labor force and number of families. The large numbers of people who came into the community (N=44) were categorized as either (1) transients, drifters,

A Categorization Using The Conceptual Framework's "The Changing Rural Community" And Responses Of Selected Agency Representatives On Changes During Impact In Five Selected Rural Energy Impact Communities

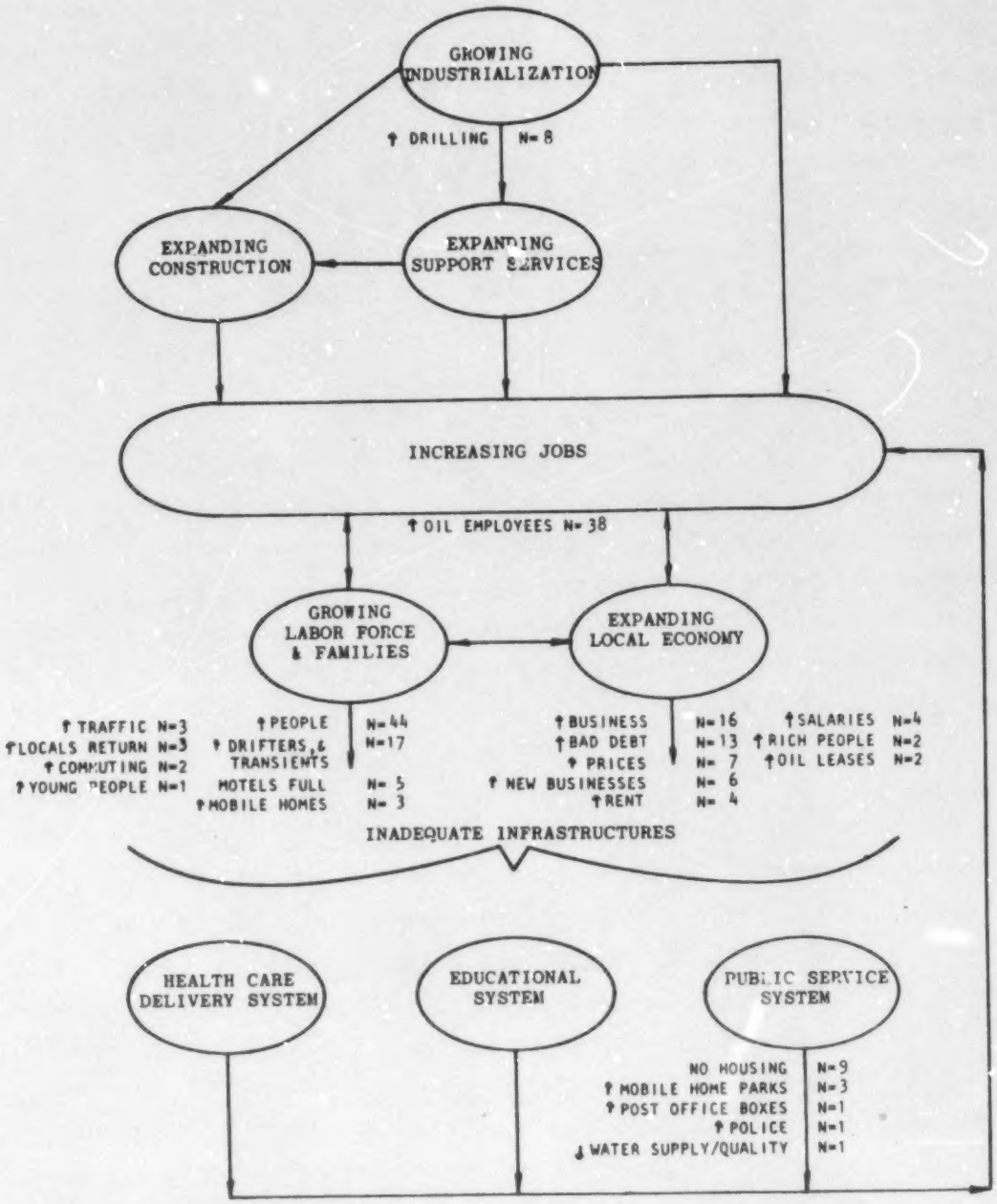

Figure 4.1

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A Categorization Using The Conceptual Framework's "The Changing Rural Community" And Responses of Selected Agency Representatives On Changes During Post-Impact In Five Selected Rural Energy Impact Communities

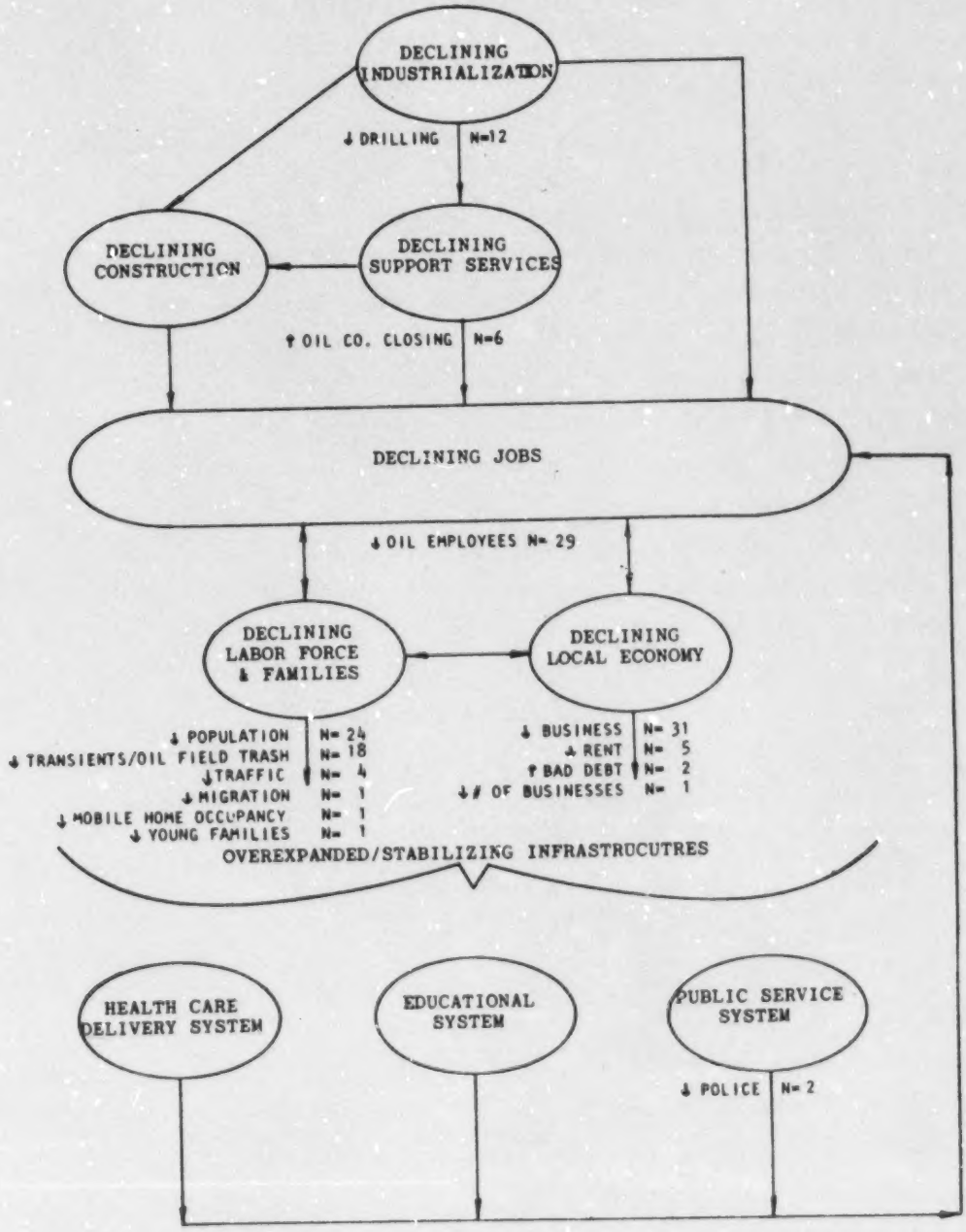

Figure 4.2

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hippies, and northerners (N=17) or (2) local people who returned to the communities in search of oil and gas related jobs (N=3). In addition to the individuals who settled in the communities, participants reported that there was a large commuting population (N=2).

Evidence of the growing communities was seen in the large numbers of people who slept in cars because the motels were full (N=5), the increasing numbers of mobile homes springing up in vacant lots throughout the towns (N=3), and the increasing amount of traffic (N=3). One participant said that during impact over eight hundred mobile homes were brought into the community.

At the same time, the local economy was also expanding. Participants stated that almost instantly prices for goods and services (N=7) and rent (N=4) started increasing. Rent for an apartment was reported to have increased 400 percent, while rent for a house increased from 100 to 250 percent over pre-impact levels. New businesses such as cafes, gas stations, banks, bowling alleys, theaters and radio stations started to spring up everywhere (N=6). One participant said, "Never in my life did I think I would wake up to the music of a radio station in this town."

There were reports that an increasing amount of money became available in the communities because of an increasing volume of business (N=16), high oil and gas salaries (N=4), and large oil and gas leasing contracts (N=2). It was not unusual for community residents to become almost instant millionaires (N=2). The following story about a poor boy turned millionaire was told by one of the study participants:

> One day I was called into E.R. to assist with an oil field accident victim. The man lying on the stretcher had been one of my grade school and high school classmates. As I looked at this man who was wearing a large, expensive necklace and was accompanied by a chauffeur, I couldn't help but remember that he was from one of the largest and poorest families in town. Throughout his school days he did odd jobs around town to help support the family. Anyway, when I started caring for him he said to me, "I am rich now! They found oil on my land and now I am buying leases and making lots of money."

Although many changes occurred in the communities' economies, agency representatives stated that not all of the economic changes were positive. Accompanying the increased cash flow in the communities were a growing number of bad debts that affected local businesses as well as the acute health care agencies (N=13).

Participants mentioned that with the growing population levels, the community infrastructures soon became inadequate. Comments were made about the

inadequacy of the public service system: no housing (N=9), an increased need for mobile home parks (N=3), a lack of policemen (N=1), decreased water supply and quality (N=1), and an increasing need for post office boxes (N=1). Agency representatives did not mention the educational system.

Post-Impact

With post-impact, a declining industrialization level was supported by the participants' remarks that drilling activities drastically decreased (N=12). No comments were made about declining construction levels. The declining support services and employment opportunities were illustrated by the large number of oil and gas businesses that went bankrupt (N=6) and the corresponding loss of oil and gas related jobs (N=29).

A majority of the participants' comments were on the declining labor force and number of families. A decrease in the communities' population (N=24) was accompanied by a reduction in the numbers of transients or "oil field trash" (N=18) and young families (N=1). Signs in the community of the declining population levels were reported as less traffic (N=4), less migration into and out of the communities (N=4), and many unoccupied mobile homes (N=1).

Agency representatives stated that there was a corresponding decline in the local economy. There was a downturn in the communities' cash flow (N=31), in the prices charged for rent (N=5) and in the number of local business establishments (N=1). At the same time, there was in increasing amount of bad debt, even more than during impact (N=2).

Only one comment was made about the overexpanded community infrastructures. In the public service system, policemen were laid off because the communities' population declined (N=2).

Summary

Agency representatives' comments indicate that, during both impact and post-impact, changes occurred in the communities' industrialization, employment, population, and economic levels. For both stages, a majority of the participants' comments were about the communities' changing population levels and economic conditions.

Changes In The Acute Health Care Delivery Systems As Identified By Agency Representatives

Agency representatives were asked what changes occurred in their places of employment during the energy impact cycle. Their responses are categorized by health manpower resources, service capabilities, operational status, physical infrastructures, and health care clients.

Changes In The Health Manpower Resources

The changes that occurred in health manpower resources are discussed by the following three categories: physicians; nurses, allied health staff, and emergency medical attendants; and the practice of health manpower resources.

Physicians

Physicians were the most frequently mentioned health manpower resources. Agency representatives' comments will be reported by the following categories: number of physicians, recruitment and retention of physicians, and the overall practice of physicians.

Participants said that the number of physicians in the communities changed with each stage of the energy impact cycle. During pre-impact, physicians and specialists were needed in the communities (N=8). With impact, the need for physicians and especially specialists in surgery, obstetrics, and internal medicine intensified (N=10). It was during impact that the largest number of physicians, specialists for surgery and internal medicine, and part-time emergency room physicians came into the communities (N=33).

With post-impact, the number of physicians again changed in the communities. A few participants stated that the community needed more physicians and specialists (N=2). However, more of the participants commented about the overabundance of physicians in their communities (N=12): "we have too many specialists and physicians," "the community has just enough physicians," the community lost physicians and specialists "because they did not have enough business," and "more physicians are now practicing part-time." In spite of the questionable need for physicians in the communities, participants claimed that some permanent and part-time physicians and specialists still established practices in the communities during post-impact (N=7).

According to participants, the recruitment and retention of physicians had consistently been a problem in the communities (N=5 for pre-impact, N=2 for

both impact and post-impact). In spite of active recruitment campaigns during pre-impact (N=2), it was especially difficult to recruit physicians (N=5). With impact, physicians became more willing to locate in the communities. A physician who came into one of the study communities during impact stated that he was attracted to the community's growing population and financial base. He continued by saying that "rural impact communities offer physicians a chance to work with young clients who have unpredictable conditions versus rural non-impact communities that have mostly geriatric clients with predictable conditions." Non-physician participants stated that during both impact and post-impact (N=3 for both) established physicians offered the most resistance to physician recruitment efforts because they felt the new physicians would take their patients.

Once physicians were recruited to an area, participants stated that it became a challenge to keep them in the community. The retention problems occurred during every stage of the energy impact cycle (N=6 for pre-impact, N=2 for impact and N=3 for post-impact), but were worst during pre-impact.

Nurses, Allied Health Staff and Emergency Medical Attendants

Agency representatives made fewer comments about nurses, allied health staff, and emergency medical attendants than about physicians. Their responses are reported as the number of nurses, allied health providers, and emergency medical attendants and the recruitment and retention of nurses, allied health staff, and emergency medical attendants.

During impact there were increases in the number of nurses, laboratory technicians, radiology technicians, pharmacists, physical therapists, dietary technicians, consultants/contract services, other health professional/technical staff, and non-health/technical staff (N=24) employed in the acute health care agencies. One hospital participant stated that deficiencies in numbers of health manpower were corrected by cross-training individuals for laboratory and radiology duties and by hiring licensed vocational nurses to take over duties of registered nurses.

During post-impact, only nurses, radiology technicians, non-health/technical staff and emergency service attendants were reported to have increased in number (N=12). Otherwise, comments centered on decreases in the numbers health manpower resources during post-impact (N=14): lost pharmacists and respiratory therapists, and too many allied health personnel, administrators,

consultants/contract services, health professional and technical staff, and non-health and technical staff.

Participants said that their rural communities had traditionally had difficulty recruiting nurses, but it became a severe problem during impact (N=13). More registered nurses were needed so that the hospitals' emergency rooms and obstetrics units could be fully staffed. Several participants commented on their communities' nurse recruitment efforts: a tuition reimbursement program was started for community residents who went to nursing school, then worked in the community for two years (N=2), Canadian nurses were brought into the community on one-year contracts with the hope that they would marry a community resident and stay in the community (N=2), and advertisements for nurses were placed in regional newspapers (N=2). When local nurse recruitment efforts failed, nurses from contract health care companies such as Nurse Finders, Upjohn, Flight Nurses, and Alpha were brought into the communities (N=6). Usually, nurses from these contract companies would work at the local hospital for six weeks.

When nurses came into the communities, it became a challenge to retain them in the communities and the acute health care delivery system. During impact (N=5) and post-impact (N=1) a number of nurses came into the communities with their oil and gas employed husbands. Since the oil and gas industry is very mobile, these nurses could be at work one day and gone the next. The following experience, which occurred during post-impact, was cited by one of the participants:

> One Monday I came to work to find that two nurses had left town with their oil field husbands. We were in a terrible dilemma in figuring out how to fill two full-time vacancies with only a handful of nurses.

Barriers to successful nurse recruitment and retention (N=4 for pre-impact, N=13 for impact, and N=2 for post-impact) were reported: the hospitals could not compete with the salaries offered by oil and gas companies, and nurses quit working in the local hospital because they could not tolerate the poor quality of care being delivered in the hospitals.

Recruitment and retention difficulties were also reported by agency representatives from the emergency medical services. Emergency medical service directors had difficulty recruiting emergency medical service attendants, especially during impact (N=4 for impact and N=1 for post-impact). One emergency medical service director said that he resorted to hiring emergency medi-

cal technicians from out of state. In fact, he stated that during impact many out of state emergency medical technicians called to inquire about work.

The Practice Of Health Manpower Resources

Agency representatives mentioned that their workloads drastically changed during impact and again with post-impact. With impact, the workloads were heavier and the work hours were longer (N=22). The exact opposite was reported to have occurred with post-impact: workloads were lighter and work hours were shorter (N=20).

Staff numbers also changed during both impact and post-impact. In the hospitals, emergency room and medication nurses were added on certain shifts during impact (N=3). In general, participants commented that during post-impact there were reductions in the number of health manpower resources (N=8): reduced staff on certain shifts and less full-time staff. One physician participant commented that during post-impact he laid off all his office staff because his patient load markedly decreased. There was one exception to the comments about decreasing numbers of full-time employees. During post-impact the emergency medical services upgraded their services and added more full-time employees because of (1) organizational changes and (2) the deficiencies that emerged during impact (N=4).

Changes In The Service Capabilities

The changes in service capabilities are discussed in categories called equipment, programs, new services, availability of services, and quality of services.

Equipment

According to agency representatives, most of the equipment changes occurred in the hospitals. During impact and post-impact (N=4 for both), new physicians in the community requested that the hospitals purchase specialized equipment. New equipment such as cardiac monitors, portable X ray machines, medicine carts, isolettes, diagnostic laboratory machines, and burn transfer equipment was purchased by the hospitals (N=12 for impact and N=6 for post-impact).

Only a few comments were made about equipment changes in the emergency medical services. During both impact and post-impact the emergency medical

services added resuscitation equipment for teaching cardiopulmonary resuscitation and communication equipment for expanding their communication abilities with the local hospital and regional medical centers (N=2 for impact and N=4 for post-impact). Participants also said that the increased number of ambulance runs during impact resulted in ambulances having to be replaced much sooner than usual (N=2 for impact and post-impact).

Programs

Agency representatives reported that health-related programs changed during every stage of the energy impact cycle. During the pre-impact stage, agencies offered continuing education for their employees (N=2). When impact occurred, the emphasis changed from in-house continuing education courses to community outreach education classes (N=5). Classes such as cardiopulmonary resuscitation and prenatal classes were offered to acquaint community residents with local acute health care services.

Again, these outreach classes were offered during post-impact (N=3), but this time with a determined effort to get more community residents to use the local agencies. At this time, the agencies began offering in-house continuing education courses on new equipment and procedures to their employees. During both impact (N=2) and post-impact (N=2) the oil and gas companies were reported to have provided emergency medical technician courses for their employees. These oil and gas employees then served as volunteer emergency medical attendants in their communities.

New Services

Very few services were reported to have changed during the energy impact cycle. In the hospitals, a pharmacy was added during pre-impact, a continuing education service for community outreach courses was added during impact and an intensive care unit was added during post-impact (N=3). Only one service change was reported in the emergency medical services. A new ambulance service was initiated in the county of one study community to help cope with the large population increases in the county.

Availability of Services

Comments about the availability of services referred to the emergency medical services, the health care provider offices and the hospitals' emer-

gency rooms. For the emergency medical services, there were opposing comments about the availability of emergency medical services at oil field sites during impact. Two emergency medical service directors said that there needed to more communication between the oil and gas drilling companies and the emergency medical services about the location of drilling rigs because ambulance drivers were often unable to find the sites of oil-related accidents. In another community, the emergency medical service director said that they did not have difficulty finding oil accident sites because so many of their volunteer attendants were oil field employees.

For all stages of the energy impact cycle, there was not a consensus among participants about the length of waits for service or the difficulty in securing an appointment with a physician. Participants mentioned that since the health care provider client loads decreased during post-impact there was no difficulty getting an appointment (N=11).

During impact, emergency room services at the hospitals were not as readily available as they were during pre-impact or post-impact. Participants stated that their delivery of emergency room services was hampered by heavy usage of the emergency room, an increased number of clients with acute conditions, a shortage of registered and licensed vocational nurses, and lack of full-time emergency room physicians (N=6).

Quality of Services

Overall, participants stated that during impact and post-impact the quality of the acute health care services improved (N=33). The primary reason cited for better acute health care services was that the number of physicians (N=22), nurses (N=11), and allied health staff and emergency medical attendants (N=10) had increased. Other comments indicated that the quality of services improved because of new equipment (N=12), expanded health care facilities (N=9) and more community programs (N=5). Not all of the participants agreed that the quality of care improved. Several participants stated that the quality of care remained the same during impact and post-impact (N=12) because the physicians (N=10), the locations for services (N=10), the facilities (N=6) and the equipment (N=6) did not change. A typical comment about the quality of services was that "the hospital has always been like a first aid station because all you can get treatment for is a head cold." A few of the partici-

pants stated that the quality of care declined during impact and post-impact (N=5). Comments such as the following were common:

--The hospital was not in good shape during impact

--The hospital needs to conduct a massive public relations campaign about its services

--Now that oil and gas activity has leveled off, we can go back to being a regular hospital

--As an attendant in this ambulance service I can honestly say I would not want care by our own ambulance crew.

In spite of the mixed reactions on the quality of care, several participants mentioned that their agencies had planned for change during both impact (N=4) and post-impact (N=3). Some of the planned changes included upgrading of emergency medical attendants' certification (N=4 for impact and N=1 for post-impact) and collaboration between the local emergency medical service and regional medical centers about ambulance transfer procedures (N=2 for pre-impact and post-impact and N=3 for impact).

Changes In The Operational Status

Changes in the operational status of the acute health care delivery systems that were described by agency representatives are detailed by finances and utilization.

Finances

Agency representatives talked about several financial changes that occurred during the energy impact cycle. These changes are discussed by the following topics: cost for acute health care services, financial status of the acute health care agencies, and outside donations to the acute health care agencies.

Most of the participants who talked about costs for acute health care services believed the costs increased during post-impact because the patient loads went down (N=4). Several of them felt that during impact and post-impact the costs for the new physicians' services and the expanded equipment services were too low. One other change in the charges for services was noted during impact. Two participants said that care would not be provided until the client agreed to pay for the care on site or made pre-arrangements for payment.

The financial status of the acute health care agencies was reported to have changed with both impact and post-impact. One hospital administrator participant remarked that the "hospital was saved from financial ruin with the oil boom. Otherwise, we would have folded. At the end of the boom we had a profit of $100,000." Other participants reported similar scenarios with their agencies. As a rule, cash flow increased in the agencies during impact because of more people being in town, increased tax subsidies from oil lands, and an increased number of payments from third party payers such as workmen's compensation and insurance claims (N=24). Corresponding with the increased cash flow were an increased amount of operating costs for the agencies (N=11), and a decreased collection rate for services rendered by the agencies because many people did not have money or insurance (N=8). A physician participant commented about his inability to collect payment:

> This is a typical story of what happened to me. I would get a call from the hospital saying that I needed to come because a lady was in labor. I get there and find out she has had no prenatal care and that she has no doctor. I can't leave her. So I deliver the baby. Afterwards, we bill her and get no pay. We try to contact her, but find out she has no phone, the box number she gave us is false, the motels and mobile home courts have not heard of her. We finally give up trying to get payment because we are losing more money by trying to track her down.

The financial status of agencies became even more unstable with post-impact. Their cash flows were reported to have dramatically decreased because increased numbers of clients could not pay for services or did not have insurance, the expenses exceeded the budget, the post-impact population level could not support the health service, and the tax subsidies were decreased (N=26). As a result of this financial situation, several agencies instituted emergency financial measures such as cutting out contract services for allied health services, laying off staff members, and closing hospital wings (N=12). A surgeon who participated in the interview stated:

> During post-impact I am having to see family practice clients to support my practice. This is very upsetting to me because I went to school to become a surgeon, not a family practitioner. I am looking for a community where I can practice surgery.

Another physician participant noted

> In 1980 I charged $15 for an office visit. That year my annual income increased 20 or 25 percent. In 1983 (post-impact), I charged $24 for an office visit, but saw an annual income increase of only 9 percent. This is because my patient load has dropped.

Beginning with impact, emergency medical services had a difficult time collecting money for services from both new and established community resi-

dents. Attendants who participated in the study stated that it was more difficult to collect money from "the richest long-time residents in town" than from new community residents because the established residents felt they were entitled to free ambulance services (N=2 for impact and post-impact).

Fund drives were mentioned as occurring during every stage of the energy impact cycle. However, most of the participants talked about the private and corporate contributions that were given to the agencies during impact (N=18). This money was used to upgrade the hospitals' equipment and its allied health, intensive care, and emergency room service areas. For the emergency medical services, the money was used to upgrade equipment.

Utilization

Utilization levels were reported to have dramatically fluctuated during impact and post-impact. Participants claimed that the emergency medical services were the busiest during impact (N=14). The level of activity during post-impact was less than that during impact, but more than pre-impact levels (N=7). During impact there were increases in the number of runs, in the distance for ambulance runs, in the number of runs to a major medical center, in the number of runs to oil and gas drilling or service sites, and in the number of unnecessary runs. With post-impact the emergency medical services' utilization decreased, with fewer runs, fewer transfers to major medical centers, fewer trips to oil and gas drilling or service sites, fewer unnecessary runs, and less distance traveled for ambulance runs.

The experience of the health care provider offices mimics that of the emergency medical services (N=20). During the impact stage, physicians were very busy, as illustrated by the following comments: physicians took no new patients, physicians' offices had an increased number of client visits, and more clients made unnecessary visits. One physician participant said,

> The most remarkable thing I have ever seen happened when I came into this oil boom community. On the first day of my practice I did not have time to even unpack my bags because my waiting room was already full.

Another physician participant commented that during impact he placed a park bench outside of his office building to accommodate the overflow from the waiting room. With post-impact, the client load in the health care provider offices decreased (N=16). Participants stated that there were a decreased

number of visits to the office and there were fewer unnecessary client visits. Several physician participants commented on their situations during post-impact:

--Patients used to come in for minor things, now they are calling me for prescriptions.

--When I came into this boom town there were quite a few doctors. It took me awhile to build up my practice. I got most of the newcomers because the other doctors were booked up. Now that the oil boom is over I have lost many of my clients. I have been the hardest hit of all the physicians in town.

--I've cut down at the hospital from full-time privileges to courtesy privileges. I do not have enough patients to warrant full-time privileges.

--My practice is almost non-existent. I have laid off all my staff. I do everything myself. As soon as I can find another community that offers me the kind of practice I am looking for I will move. There is another doctor in town that is job hunting for the same reason.

According to agency representatives, the hospitals shared the same experience as the other acute health care agencies. During impact the hospitals had high utilization rates (N=18). There were reports of increases in the numbers of patient admissions, surgeries, unnecessary surgeries, deliveries, Caesarian sections, emergency room visits, and unnecessary emergency room visits. Some comments about utilization rates during impact are as follows:

--People used emergency room instead of the doctors' offices because they received quicker service and could then go back to their high paying oil jobs.

--People were admitted to the hospital for anything because money was no hindrance to them.

--All the hospital rooms were full, so we had patients in the halls and lounges.

With post-impact, the hospitals' utilization rates declined (N=15). Several participants commented on the decline, saying there was a decrease in the numbers of patient admissions, surgeries, deliveries, emergency room visits, and unnecessary emergency room visits. Two of comments illustrate the severity of the decline:

--I (a physician) came to this community during the oil boom. The established doctors admitted to the hospital about 250 patients per year. I admitted about 120 per year. Since the slowdown all of us doctors are admitting about 150 patients each year to the hospital.

--With the slowdown in oil activity, the local hospital is no longer needed because the clientele is gone.

During post-impact, the number of laboratory and surgical out-patient procedures increased (N=2). The number of lab procedures increased because the health care provider offices no longer did them. Out-patient surgical procedures increased because they were a cheaper way to have surgery.

Changes In The Physical Infrastructures

Remarks from agency representatives about changes in the physical infrastructures of the acute health care agencies are discussed by size of the physical infrastructures and building projects involving the physical infrastructures.

Size Of The Physical Infrastructures

Very few comments were made about the size of the agencies' infrastructures. These comments pertained to the overbuilding of hospital facilities during impact and post-impact. During impact, there were often not enough patient beds and service areas for out-patient procedures (N=3). One participant stated that with post-impact, the hospital had entirely too much service area because there were no patients.

Building Projects Involving The Physical Infrastructures

Agency representatives said that expansion projects in the acute health care agencies occurred during pre-impact (N=2), impact (N=6), and post-impact (N=1). However, most of the expansion projects and all of the remodeling projects occurred during impact.

Only two comments pertained to changes in the physical infrastructures of the emergency medical services. During post-impact, new garages were built for the ambulances.

Building projects in the hospitals were initiated to expand the bed capacity during impact (N=2) and establish an intensive care unit during post-impact (N=1). Participants cited the hospital boards' hesitancy to engage in costly building projects during impact, because "one never knows how long the impact will last." One participant remarked that "with the boom, we thought we needed a new hospital, but I am glad we decided to remodel only." Another comment was that the hospital's major remodeling project was stopped during post-impact because there were so few patients.

The health care provider offices were also involved with building projects during pre-impact and impact. Several office buildings were built as recruitment incentives for physicians (N=1 for pre-impact and N=2 for impact). Other participants said that new offices were established by incoming physicians during impact (N=4).

Changes In The Health Care Clients

Agency representatives were eager to talk about changes in the health care clients during the energy impact cycle. Their comments are categorized as follows: characteristics of health care clients, the use of acute health care services by health care clients, and the health status of health care clients.

Characteristics Of Health Care Clients

Participants stated that the clientele of the acute health care delivery services changed substantially during impact and again during post-impact. Accompanying impact was a new kind of clientele, with reports of more transients (N=21), more new community residents (N=20), more young adults (N=9), more clients who worked with oil and gas companies (N=4), more illegal aliens (N=4), more children under six (N=3), more school aged children (N=2), and more clients away from family support systems (N=1). The clientele changed again during post-impact, with reports of fewer transients (N=15), fewer new community residents (N=9), fewer clients who worked with oil and gas companies (N=4), fewer illegal aliens (N=2), and fewer pediatric clients (N=1), and more long-time residents (N=9).

Use Of Acute Health Care Services By Health Care Clients

Some changes in the use of local acute health care services were mentioned by agency representatives. From their comments, it appears that community residents increased their use of the local services during impact (N=13). Some of the participants felt that during impact more residents used the local acute health care services unnecessarily (N=8). With post-impact, the residents either decreased their use of the local services (N=10) or did not use the local services at all (N=6).

New community residents were often uncertain how and when to use the local acute health care services (N=6 for impact). The following comments illustrate the newcomers' use of the agencies: "many of the obstetric patients

were lucky to have two prenatal visits before delivery," "newcomers would call me (a physician) at night for an illness they had for four days," and "even though their child might have been sick for three days, the mother would not call me (a physician) until daddy came home from the oil field."

Several physician participants talked about the sporadic use of the local services by new community residents. Since these individuals followed the oil field work, they did not have regular physicians (N=4). Therefore, there was no continuity of care or opportunity for the physician and the client to build up a trust relationship. An experience of one of the physician participants illustrates this situation:

> One day when I was on emergency room call I treated an oil field worker who had a dislocated shoulder. He told me that he had received treatment for the same condition at a distant hospital about ten days earlier. At the time of his initial treatment he was given a shoulder harness. The harness bothered him so he threw it away. If he would have had better teaching, maybe he wouldn't have thrown the harness away and needed another emergency room visit.

Often, the only time a physician saw these oil and gas employees was either in the emergency room or in the health care provider office for a physical examination. During impact, physicians reported giving six to ten physical exams per day to oil field workers (N=3). With post-impact physicians claimed that fewer than fifty clients per month were getting physical examinations for oil and gas employment (N=2).

Health Status Of Health Care Clients

Agency representatives reported some substantial changes in the health status of clients during both impact and post-impact. With impact, increases occurred in the frequency of some illnesses or conditions. Some general observations included: more individuals required major emergency care and advanced life support (N=5), new residents brought new health problems (N=3), more individuals required minor emergency care (N=2), long time residents brought new health problems (N=1), and clients were sicker (N=1).

Participants said that during impact there were increases in the number of oil and gas related injuries (N=33), motor vehicle or motorcycle accidents (N=16), drug and alcohol abuse cases (N=9), physical abuse cases (N=8), and deaths (N=6). There were growing numbers of clients with the following conditions: fractures (N=20), burns (N=19), head injuries (N=15), trauma (N=14),

emotional problems (N=7), infections (N=2), heart attacks (N=2), respiratory conditions from the wind, dust, and allergies (N=2), and rape (N=1).

The number of oil and gas related injuries increased during impact. These injuries were reported to be amputations, cuts, lacerations, foreign bodies in the eye, heat exhaustion and crushing-type injuries. Orthopedic injuries most often occurred to the hands, the back and the fingers. Participants cited several reasons why oil and gas injuries occurred: falls, inexperience and carelessness, fights, the influence of drugs and alcohol, fatigue, and malfunctioning equipment.

Participants freely related stories about their experiences caring for oil and gas injured victims. Examples of these stories follow:

--A young man was brought into our emergency room after he fell off an oil rig. After his accident, his friends at the work site loaded him into a pickup and brought him in. When he arrived in the emergency room, he had a spinal cord injury. It's hard to say if the spinal cord injury occurred because of the fall, because of the move into the pickup, or because of the pickup ride into town. This boy is alive, but he will never walk again.

--We had a young fellow come in with mysterious abdominal pain after falling off an oil rig. The doctors could not figure out what was wrong with him, so they admitted him into the hospital. Later on we found out that was exactly what he was hoping for. This fellow had worked two or three continuous shifts, and it was the dead of winter. He wanted some rest and warm food, so he faked a fall and injury.

--I will never forget cleaning up a young boy who had been involved in an oil field accident. His buddies brought him by pickup to the emergency room. They carried him in on a dirty, greasy tarp. He was grease from head to toe. Mixed with the grease was bone and flesh from a compound fracture of his leg.

--We had a lot of burn victims, but the one I remember the most was a young guy who was standing too close to a warming barrel. His clothes were all greasy from his work and his clothes caught on fire. We transferred him to a regional burn unit.

--A young boy was brought to the emergency room after a wrench fell thirty feet and hit him on the head. He had a skull fracture and a subdural hematoma. We transferred him out and we have never heard his outcome.

--A twenty-four year old boy was brought in by pickup after a valve released and he was sprayed with a liquid at a tremendous amount of pressure. He had a basal skull fracture and was dead on arrival.

As reported in the narratives above, it is not uncommon for oil field accident victims to be brought to the hospital by pickup. Because the local hospital is often closest to the accident site, it gets the oil field accident victims

at the "worst point, then has to stabilize them, and ship them out to a major medical center".

During post-impact, the nature of clients' conditions changed again. In most cases, agency representatives saw fewer acute injuries. They reported fewer cases requiring minor (N=2) or major (N=5) emergency care and fewer clients with injuries from oil and gas accidents (N=20), motor vehicle or motorcycle accidents (N=10), physical abuse (N=6), or drug and alcohol abuse (N=2). There were fewer clients with trauma (N=9), fractures (N=8), burns (N=7), head injuries (N=5), emotional problems (N=3), deaths (N=3), and poisonous inhalations (N=1).

Summary Of Changes In The Acute Health Care Delivery Systems

Agency representatives identified that many changes occurred in the acute health care delivery systems' health manpower resources, service capabilities, operational status, physical infrastructures, and health care clients during both impact and post-impact.

For health manpower resources, major increases occurred during impact and post-impact in the number of health manpower resources because recruitment efforts were more successful than they had been during pre-impact. With post-impact, there were almost too many health manpower resources in the communities. A major change in the practices of health manpower resources occurred during impact, when workloads were heavy, and again during post-impact, when workloads were light.

A majority of the changes in service capabilities began during impact and were carried over into post-impact. Changes included new equipment, more community outreach classes, and new services. Some participants indicated that the availability of services declined during impact, but improved with post-impact. Overall, the quality of care in the acute health care agencies was reported to have improved during impact and post-impact

Changes in the operational status during impact included agencies having (1) increased cash flow, but at the same time more expenses and bad debts and (2) increased utilization rates. During post-impact agencies had (1) less cash flow and more expenses and (2) a dramatic decline in utilization rates.

The physical infrastructures changed during the energy impact cycle with building projects occurring in the emergency medical services during post-

impact, in the health care provider offices during pre-impact and impact, and in the hospitals during impact and post-impact.

Changes in health care clients during impact included more transient clients, more community residents using the local services, and more clients having acute health care conditions. During post-impact there were fewer transient clients, more long-time residents making up the agencies' caseloads, fewer community residents using the local services, and fewer clients with acute conditions.

Analysis of Community Resident Interviews

The community resident interviews are presented in three parts. First, the community residents who participated in the interviews are characterized. This is followed by a breakdown of the participants' perceptions of changes during the energy impact cycle in their communities and in their communities' acute health care delivery systems.

Characteristics of Community Resident Participants

In each of the five study communities, ten community residents were interviewed. Of these fifty interviews, 52 percent (N=26) were held with men and 48 percent (N=24) were held with women. By race, 82 percent of the participants (N=41) were Caucasian and 18 percent were Hispanic. A breakdown of participants by age shows that 10 percent (N=5) were between eighteen and twenty-five years, 36 percent (N=18) were between twenty-six and forty-four years, 38 percent (N=19) were between forty-five and sixty-five years, and 16 percent (N=8) were over sixty-five years. The sample was generally representative of the sex, race, and age composition of nonmetropolitan Texas residents as obtained from 1980 U.S. Census data.

Information was also obtained on the participants' length of residence in the study communities. A majority of participants had resided in their community for over ten years. Their length of residence in the community is as follows: 2 percent (N=1) had resided in the community for less than two years, 12 percent (N=6) between two and six years, 8 percent (N=4) between six and ten years, and 78 percent (N=39) for over ten years. Most of the participants had resided in the study community for every stage of the most recent energy impact cycle.

Changes In The Rural Energy Impact Communities As Identified By Community Residents

Participants from the five study communities gave a wide variety of responses to what happened in their communities from before the oil boom (pre-impact) to during (impact) and then to during the oil bust or slowdown (post-impact). Their responses about impact and post-impact are discussed by the categories identified in the conceptual framework under the section "The Changing Rural Community" (Figures 4.3 and 4.4).

Impact

The growing industrialization that occurs with impact was evidenced by an increased amount of exploration and drilling activity in the communities (N=5). With the increasing level of oil and gas activity, expanding construction levels also occurred. Participants commented that more homes and business establishments were built in the community (N=3).

Several comments were made about the communities' expanding oil and gas support services and employment opportunities. Participants stated that the number of high paying jobs available in the local oil and gas fields rapidly increased (N=13). In fact, one participant commented that local businesses in his community were unable to find employees willing to work for small wages. In this community, city officials raised the wages of a city employee from $3.50 to $8.50 an hour so that he would not leave city employment. In-migrating welders also took advantage of the expanding local oil and gas support services by setting up businesses (N=2).

Many of the participants commented on the growing labor force and number of families entering the community. The most frequently reported sign of impact was that more people were entering the community (N=27). There were several tell-tale signs reported that indicated the communities' population levels were growing: an increased amount of traffic (N=5), an increased amount of migration both into and out of the communities (N=3), an increased volume of mail (N=1), and an increased number of local newspaper subscriptions (N=1). Three participants stated that a majority of the individuals moving into the community were young families. Other comments which supported the expanding populations levels were that mobile homes were springing up in every vacant lot in the community (N=10), that trailer parks, motels, and hotels were filled beyond capacity (N=8), and that people were sleeping in tents and

A Categorization Using The Conceptual Framework's "The Changing Rural Community" And Responses Of Randomly Selected Community Residents On Changes During Impact In Five Selected Rural Energy Impact Communities

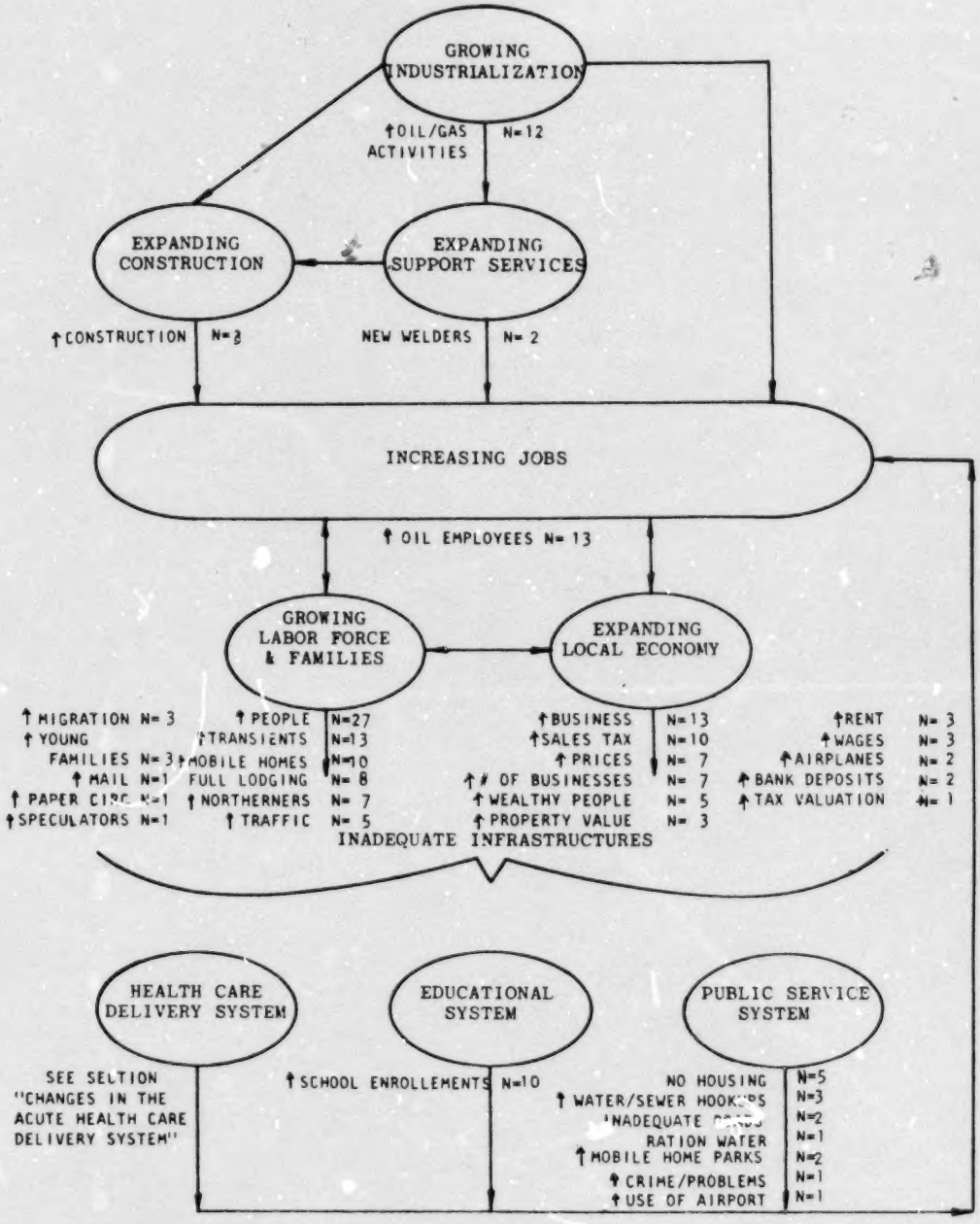

Figure 4.3

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A Categorization Using The Conceptual Framework's "The Changing Rural Community" And Responses Of Randomly Selected Community Residents On Changes During Post-Impact In Five Selected Rural Energy Impact Communities

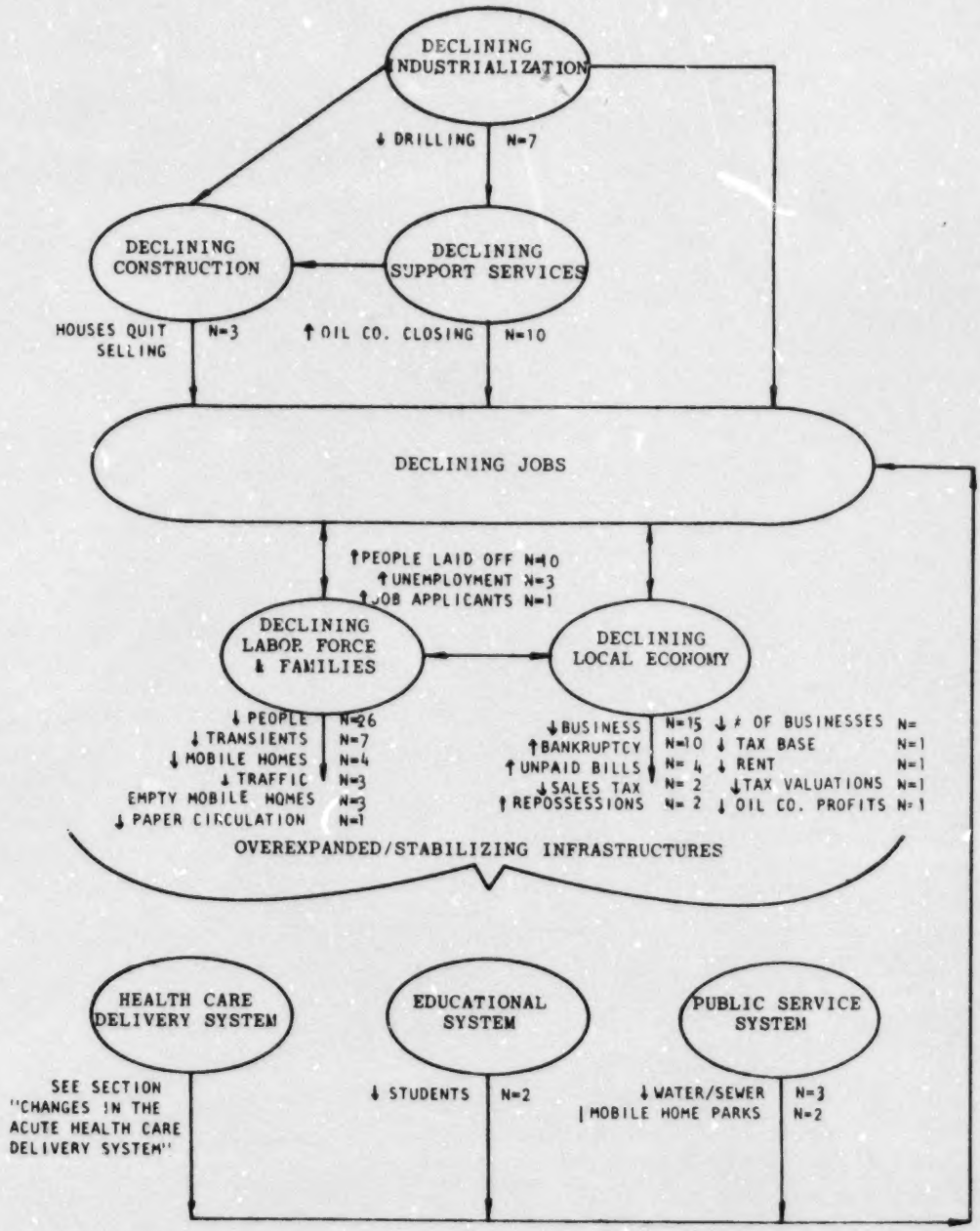

Figure 4.4

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cars (N=1). Individuals who came into the community with impact were called transients, hippies, trashy people, or fly-by-nights (N=13), northerners (N=7) and speculators (N=1).

The category receiving the most comments from community residents was expanding local economy. Problems associated with the expanding economy revolved around higher prices for goods and services in the community (N=7) and greatly inflated rent prices (N=3). On a positive note, participants stated that business levels were much higher than before the impact (N=12), local tax dollars increased, benefiting the communities' schools, roads, and services (N=10), wages greatly increased (N=3), property values increased (N=3), and bank deposits greatly soared (N=2) because some people became very rich (N=5). Another sign of impact became evident when new businesses such as cafes, convenience stores, and motels opened in the community (N=7). One participant commented, "With the oil boom, they opened four convenience stores in town. Before that, we never knew we were inconvenient."

Comments were also made about the minimal and inadequate community infrastructures. Participants' remarks primarily centered on the public service system: difficulty in finding a house (N=5), the increasing number of water and sewer hookups (N=3), the inadequate roads (N=2), the increasing amount of problems and crime (N=2), the lack of water (N=1), the increasing use of the airport (N=1), and the increasing number of mobile home parks (N=1). Ten participants stated that rapidly growing school enrollments caused the local educational systems to become overburdened.

Post-Impact

Comments made about declining industrialization levels and declining number of support services during post-impact dealt specifically with the oil and gas industry: an increasing number of oil and gas companies closing (N=10) and a drastic reduction in the amount of drilling in the area (N=7). With post-impact, participants said that construction levels declined because houses quit selling (N=3). One participant stated that the decline in housing sales was the first sign in the community that the impact was over.

Comments about the declining number of jobs in the communities were as follows: many people employed by oil and gas companies were laid off (N=10), unemployment levels rose (N=3), and there were an increased number of job applicants at local businesses (N=1).

Several participants mentioned that both the labor force and family numbers declined in their communities. Most noticeable was the number of people leaving the community (N=26). Other comments were that the number of transients in the community (N=7) and the number of mobile homes in the community (N=4) were drastically reduced. Other tell-tale signs included a decreased amount of traffic (N=3), a growing number of vacated mobile homes that were not paid for (N=3), and a decreased number of local newspapers in circulation (N=1).

Once again, the declining local economy was most noticed by the participants as a sign that post-impact had occurred in their communities. The most profound economic sign was that oil and gas companies suddenly went bankrupt (N=10). Fifteen participants stated that the level of business in the communities greatly declined. Other signs included individuals and companies being unable to pay their bills (N=4) and banks repossessing trailers and cars (N=2). One participant stated that he knew a welder who left the community with a $1500 unpaid gas bill. Another participant stated that a furniture store in the community lost $60,000 when an oil and gas company that had recently purchased furniture went bankrupt. Several participants expressed concern over the declining tax revenues: decreasing sales tax (N=2), falling tax valuation levels (N=1), and a diminishing tax base especially for the local community's benefit (N=1). Two participants commented that local businesses closed due to lack of customers.

Comments were made about the over-expanded community infrastructures. The remarks were as follows: too many trailer parks (N=3), lack of customers to use the expanded water and sewer hookups (N=3), and a declining number of students (N=2).

Summary

Community residents' comments indicated that the rural energy impact communities changed with both impact and post-impact. For both impact and post-impact, there were changes in industrialization, construction, employment, and population levels. The communities also experienced changes in their local economy and community infrastructures. All of these changes support the conceptual framework section called "The Changing Rural Community."

Changes In The Acute Health Care Delivery Systems As Identified By Community Residents

Community residents were asked what changes occurred in the emergency medical services, health care provider offices, and hospitals during the energy impact cycle. In general, residents were not familiar with changes in the acute health agencies unless they had participated in the changes or had read about them in the local newspapers. For many of the residents, their knowledge of the local agencies was limited because they, their families, and their friends did not use the local acute health services.

Participant responses are categorized by health manpower resources, service capabilities, operational status, physical infrastructures, and health care clients.

Changes In The Health Manpower Resources

Changes in the health manpower resources are discussed by the following three categories: physicians, other health manpower resources, and the overall practice of health manpower resources.

Physicians

Of all the health manpower resources involved with the acute health care delivery system, physicians were most often mentioned by community residents. The responses of community residents are reported by the number of physicians, and the recruitment and retention of physicians.

The number of physicians practicing in the rural energy impact communities was considered by community residents to be a major change occurring in the acute health care delivery system during the energy impact cycle. A typical problem during the pre-impact stage was reported to be the need for more physicians, particularly specialists (N=13). Community residents stated that this need for physicians, but even more so for specialists, became more pronounced during the impact stage (N=17). Although the need for physicians seemed to be a typical problem for the rural energy impact communities, participants commented that it took an oil and gas impact to actually recruit physicians and specialists to their communities (N=38). Then, during the post-impact stage, the number of physicians was reported to have both increased (N=4) and decreased (N=5). Participants expressed various needs for

additional physicians during the post-impact stage, with five stating that they needed more physicians and specialists and two stating that their community had enough physicians.

Changes in the recruitment and retention of physicians was mentioned by a few community residents. The difficulty in recruiting physicians was mentioned as a problem during pre-impact (N=3), impact (N=2), and post-impact (N=1). One participant said that the really active recruitment efforts occurred during impact. With post-impact, it was reported that physicians were still responding to recruitment literature issued during the community's impact stage (N=1). A retention problem occurred when in-fighting occurred between the established physicians and the new physicians (N=1 for pre-impact, N=3 for impact and post-impact). The in-fighting resulted from the established physicians' fear that the new physicians would take over their patients.

A few community residents talked about the changes that occurred in the physicians' practice. During pre-impact (N=3), impact and post-impact (N=5 for both), participants stated that the physicians in their community were behind times in practice. More residents believed that the community's physicians were overworked during impact (N=3) than during pre-impact (N=1). Participants reported that the quality of the physicians' practice improved during impact (N=6) and post-impact (N=2).

Nurses and Allied Health Staff

Participants' responses about nurses and allied health providers are discussed by the numbers of nurses and allied health providers and their recruitment and retention.

It was reported that there were increases in the numbers of nurses, physical therapists, pharmacists and respiratory therapists during both impact (N=10) and post-impact (N=2). Five participants mentioned that the number of other health manpower resources decreased during post-impact because of layoffs in the acute health care delivery systems.

The recruitment and retention of nurses was a problem during impact (N=3) and post-impact (N=1), but especially during impact. It was almost impossible to recruit nurses into the rural energy impact communities. During impact, local fund drives were initiated for sponsoring local residents to attend nursing school (N=3) and ads for nurses were placed in regional newspapers (N=2). Once nurses came into the community it was equally difficult to retain

them. Either nurses would enter and leave the community with their mobile, oil-employed spouses (N=2 for both impact and post-impact) or they would quit nursing to enter high-paying oil field jobs (N=3 for both impact and post-impact).

The Practice of Health Manpower Resources

According to the participants, the practices of the physicians, nurses and other health professionals drastically improved during impact (N=8). Reasons cited for improved acute health care services included more interest in the patient and a commitment by health professionals to improve the quality of acute health care services offered in the communities (N=9).

Changes In The Service Capabilities

The changes in service capabilities are discussed by the categories of equipment, programs, new services, availability of services, and quality of services.

Equipment

Community residents talked about new equipment which was purchased during pre-impact (N=3), impact (N=15) and post-impact (N=6). According to participants, only emergency medical service equipment was upgraded during pre-impact. With impact, equipment was added in the emergency medical service and the hospitals' obstetric, intensive care and emergency units because the new physicians wanted to expand the existing services. With post-impact, participants noted that equipment was added in the emergency medical service and the hospital. Even though equipment was added during all three stages of the energy impact cycle, a few participants still believed the acute health care delivery system in their community was using old equipment.

Programs

According to the participants, most of the new programs for community residents were begun during impact (N=7) and post-impact (N=4). Several of these programs were designed so that community residents could directly aid the acute health care agencies in their delivery of services. These programs included candy striper services, hospital auxiliary services, cardiopulmonary

resuscitation courses for community residents, and emergency medical technician courses for emergency medical attendants.

New Services

Most of the new services in the hospitals and the emergency medical services were begun during impact (N=4). In one hospital, an intensive care unit was added. Also, a new emergency medical service was added in the county of one study community so that the local emergency medical service would not have such a large service area. Community residents were not aware of any new services in the health care provider offices.

Availability of Services

Most of the community residents stated that they were unaware of changes in the availability of services during the energy impact cycle. A few residents stated that during impact it was difficult to get an appointment with a physician and that they had long waits for service when they arrived for scheduled doctor's appointments (N=3). One participant stated that during impact "people were hanging from the rafters" in her physician's office.

During post-impact physicians became very available, with residents saying that they had no difficulty getting an appointment and that they had short waits for service (N=6). In one community, the hours of service were increased because the new physician was able to maintain and expand the clientele he established during impact.

Quality of Services

Participants gave a variety of responses to how the quality of the acute health care services changed during the energy impact cycle. Overall, a majority of the residents claimed that the quality of services improved during the energy impact cycle (N=37), but that the quality of service was the best during impact (N=17). Reasons cited for the improvement in services included new physicians coming into the community (N=23), new equipment being added in the acute health care agencies (N=21), more illnesses and emergencies could be treated locally (N=15), the acute health agencies were expanded (N=12), and more local acute health related programs were available in their communities (N=7). One resident stated that the changes initiated in the local hospital

with impact and completed during post-impact "have made the hospital comparable to other rural hospitals in Texas."

Some of the community residents stated that the quality of services remained the same during the energy impact cycle (N=14). These participants stated that there were no changes in the quality of services because their communities had the same locations of service (N=11), physicians (N=8), community programs (N=6), facilities (N=5), nurses (N=4) and equipment (N=4).

Only two community residents stated that acute health care services became worse during the energy impact cycle. The only reason cited was that there were too many physicians in the community during post-impact.

Changes In The Operational Status

Changes in the operational status of the acute health care delivery systems that were described by community residents are detailed by finances and utilization.

Finances

Residents talked about several financial changes that occurred during the energy impact cycle. These changes are discussed by the following topics: costs for acute health care, financial status of the acute health care agencies, and outside donations to the acute health care agencies.

With impact, the costs for emergency medical services, physicians' visits, and emergency room fees increased (N=4). Costs for physician's office visits continued to increase during post-impact (N=3). Only one participant for both impact and post-impact stated that the increasing health care costs were too much. One participant stated that with new physicians in the community and the acute health care delivery systems' expanded service capabilities, the health care costs during impact should have increased even more. Another interesting change from pre-impact was that during impact and post-impact health care provider offices did not provide care without prepayment arrangements.

A few participants stated that the financial status of the acute health care agencies changed during both impact and post-impact. With impact, the agencies needed more money just to operate (N=6). Many agencies were plagued by "transient-type people" who would not pay their bills (N=4). One resident reported that the community increased its emergency medical services subsidy

from $1200 to $6000 per month so that the service could continue in the community. At the same time, payment from third party reimbursers increased because more workmen's compensation claims were filed (N=3).

For post-impact, community residents were most aware of their local hospitals' financial status. The hospitals were experiencing financial difficulties because an increasing number of their clients had lost jobs in the community and/or were unable to pay health insurance premiums (N=10). In order to cope with growing hospital debts, residents stated that their local hospitals initiated changes such as creating a hospital district to benefit from oil and gas taxes, joining hospital buying groups to reduce the cost of supplies, and requesting an increased amount of subsidy from the hospitals' sponsor (N=6).

During pre-impact, outside donations for the acute health care agencies were uncommon. With impact, the participants stated that both citizens and businesses in the local community became more interested in the financial needs of the hospital and emergency medical service (N=9). For the hospitals, money was raised to purchase equipment, to build an intensive care unit, and to set up a helicopter emergency landing pad. Emergency medical services received donations to purchase "Jaws of Life" equipment. Even during post-impact, donations were made to a hospital to upgrade its equipment and its physical therapy.

Utilization

Community residents claimed that the use of acute health care agencies greatly increased during impact (N=20) and greatly decreased with post-impact (N=24). With impact, the emergency medical services' utilization increased, with more runs, more miles, and more transfer runs out of the communities. In the health care provider offices, the physicians were very busy and taking no new patients. The hospitals' utilization rates increased in the obstetrical unit, the surgical unit, and the emergency room.

During post-impact, residents reported that the emergency medical services made fewer ambulance runs, the health care provider offices needed patients, and the hospitals' census was low because the local physicians were not admitting enough patients. However, ambulance transfers out of the community continued to increase because the local hospital and physicians still provided only very general types of health care.

Changes In The Physical Infrastructures

Remarks by community residents about changes in the physical infrastructures of the acute health care agencies are discussed by size of the physical infrastructures and building projects involving the physical infrastructures.

Size Of The Physical Infrastructures

Comments on the size of the physical infrastructures pertained entirely to hospitals in the rural energy impact communities. Two community residents stated that the hospital service did not change during any stage of the energy impact cycle. Other remarks were that the hospital should have remodeled or expanded during pre-impact and that the hospital needed more allied health service areas during impact (N=2).

Building Projects Involving the Physical Infrastructures

Community residents stated that expansion and remodeling projects occurred during every stage of the energy impact cycle. According to their comments, more residents were aware of expansion and remodeling projects in the hospital during the impact stage (N=11) than during pre-impact (N=2) and post-impact (N=4). One participant said the expansion project during impact was to modernize the hospital by upgrading the physical therapy and out-patient areas and building an intensive care unit. In one community, three residents commented that new health care provider offices were built during pre-impact and impact to help recruit physicians into the community.

Changes In The Health Care Clients

The changes in the health care clients as perceived by community residents are discussed by characteristics of health care clients, the use of acute health care services by health care clients, and the health status of health care clients.

Characteristics of Health Care Clients

Community residents identified only one change in health care clients with impact and again with post-impact. They stated that during impact many more health care clients were "transient types" who were in the community one day

and gone the next day (N=12). The number of transients using the acute health care services decreased with post-impact (N=9).

Use Of Acute Health Care Services By Health Care Clients

Of interest is the number of community residents who remarked that they and their families and friends did not use the local acute health care services during pre-impact, impact or post-impact (N=17). Several participants commented that during impact (N=5) and post-impact (N=3) they would use the local acute health care agencies only for emergencies. Several reasons were given by community residents for not using the local agencies: wanted more sophisticated service, physicians did not return calls, inexperienced physicians, poor quality physicians, physicians were behind times in practice, the agencies were not interested in the patient, the agencies did not want to improve health care, the agencies "did not provide medical care, but just first-aid," the quality of care depended on who the patient was, the hospital was not clean, and the hospital was such poor quality that "we cannot attract good physicians here."

Health Status of Health Care Clients

Community residents mentioned a number of changes in the health status of health care clients during impact and post-impact. They said that with impact there were more industrial accidents (N=15), more victims of car accidents (N=10), more deaths (N=3), more violent injuries (N=3), more alcoholism (N=2), and many new health problems brought in by the new residents (N=1). The industrial accidents participants referred to were all oil and gas related accidents which they said were caused by carelessness and inexperienced workers--"when the boom comes you get anybody to work you can get; if you don't get the oil someone else will."

According to the participants' comments, the health status of clients during post-impact changed to almost opposite of that during impact. There were fewer industrial accidents (N=8), car accidents (N=6), violent injuries (N=3), and deaths (N=3), but more child abuse victims (N=1).

Overall, residents stated that they became much more concerned with their personal health care and the acute health care services in their communities during impact (N=5) and post-impact (N=2).

Summary

Community residents responded to the interview with a wide variety of comments on changes in the acute health care delivery system. For health manpower resources, the number of physicians, nurses, and allied health staff increased during impact and post-impact. In the service capabilities, new equipment and new types of service were added during impact.

For operational status, residents stated that health care costs increased, agencies received more payments from workmen's compensation, agencies incurred more bad debts, and the agencies' utilization rates increased. With post-impact, the acute health care agencies provided more services to indigents and experienced lower revenues and client loads. Residents stated that the physical infrastructures changed because building and expansion projects occurred in the hospitals during impact and in the health care provider offices during pre-impact and post-impact.

Changes in health care clients during impact included more of the clients being transient, more community residents leaving the local communities for acute health care services, and more clients being treated for acute conditions. With post-impact, fewer transients used the acute health care services and the number of clients with acute health care conditions declined.

Summary

Chapter IV presented the results of data analysis. The chapter began by characterizing the study communities, their population, location, acute health care provider facilities, previous experience with the energy impact cycle because of oil and gas activities, and previous experience with other energy activities. Then, the analysis of survey data from the emergency medical services, the health care provider offices, and the hospitals was presented. Survey data about the health manpower resources, the operational status, the physical infrastructures, and the health care clients were presented .

The chapter concluded with findings from the agency representative and community resident interviews. The interview data included (1) a characterization of the participants, (2) the participants' perspective on changes in the rural energy impact communities during impact and post-impact, and (3) the participants' perspective on changes in the health manpower resources, the service capabilities, the operational status, the physical infrastructures,

and the health care clients of the emergency medical services, the health care provider offices, and the hospitals.

In the following chapter, Chapter V, a discussion of these findings will be presented, and in Chapter VI the summary and conclusions of the study will be presented.

CHAPTER V

DISCUSSION OF FINDINGS

In this chapter, findings from the survey and interview data are discussed in relation to (1) the study communities, their characteristics, and their changes during the energy impact cycle and (2) the changes that occurred in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle.

Discussion of Findings

The Rural Energy Impact Communities

The rural energy impact communities are presented by the communities' population, their location, and their number of acute health care agencies. In conclusion, the communities' experiences with the energy impact cycle because of oil and gas activities and with other energy activities are discussed.

Population

The communities could be considered small rural communities because in 1980 each of them had a population of less than ten thousand. In comparison with other rural energy impact communities, the study communities were larger. Murdock, Leistritz, and Schriner (1983) and Olsen and Uhlmann (1981) found that a majority of the rural energy impact communities in Arizona, Colorado, Montana, New Mexico, North Dakota, Oregon, Texas, Utah and Wyoming had populations of less than 2,500.

Prior to the most recent energy impact cycle the study communities experienced fluctuating, but primarily increasing, population levels. In contrast, Albrecht (1978) found that the populations of nine rural energy impact communities in Colorado, Montana, North Dakota, Utah and Wyoming declined before impact. The study communities differed from the communities described in Albrecht's study because the study communities (1) experienced impact from oil and gas activities rather than coal mining activities and (2) experienced multiple energy impact cycles related to oil and gas activities rather than one energy impact cycle related to a single industry such as coal mining.

During impact the study communities experienced annual population increases ranging from 12 to 153 percent. The population changes in the study communities were consistent with findings from other studies. Murdock, Leistritz and Schriner (1982), Olsen and Uhlmann (1981), and Slaughter et al. (1982) found that with impact most rural communities experienced annual population increases exceeding 5 percent.

Location

The study communities were located from fifty-four to ninety-three miles from cities of fifty thousand or more population. Olsen and Uhlmann (1981) and Uhlmann (1978) also found that rural energy impact communities were located a considerable distance from metropolitan areas. Findings from their studies show that many rural energy impact communities are more than one hundred miles from cities of fifty thousand or more population.

Number of Acute Health Care Agencies

Each of the study communities had one emergency medical service, one hospital and several health care provider offices. Studies of rural energy impact communities in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming showed that rural energy impact communities often lacked acute health care services (Olsen and Uhlmann 1981). The most common type of acute health care agency in these rural energy impact communities was a health care provider office. The number of acute health care agencies in the study communities differed from the communities in Olsen and Uhlmann's study because only communities that had a minimum of one emergency medical service, health care provider office, and hospital were included in this study.

Experience With Oil and Gas Activities

Each of the study communities had experienced several energy impact cycles because of oil and gas activities. The study communities' experience with the most recent energy impact cycle imitated the nation's experience ("OGJ..." 1984; Southern States Energy Board 1981). For all of the communities, the most recent energy impact cycle began in the late seventies and ended in the early eighties.

The study communities changed during every stage of the energy impact cycle. Changes in the communities' oil and gas activities; employment, popu-

lation, and economic levels; and community infrastructures were consistent with changes that occurred in other rural oil and gas impact communities during the energy impact cycle (Briscoe, Maphis, Murray, and Lamont, Inc. 1981; Chase and Leistritz 1982; Potisk 1982; Roosevelt-Custer Regional Council 1981; Shontz 1981).

During pre-impact the semi-stable levels of oil and gas activities around the study communities caused them to have consistent levels of construction activities, oil and gas related support services, and oil and gas related jobs. Since the industrial levels were stable, the communities' populations remained at nearly constant levels. Overall, the communities' local economies were fairly stable, fluctuating with the market for oil, gas and agricultural products. No major changes occurred in the community infrastructures because their services were considered adequate. Overall, the pre-impact communities could be considered small, sleepy oil and agricultural towns.

As the oil and gas activities increased with impact the study communities became hosts to oil and gas leasing, exploration, drilling, and welding companies. Since construction levels had been relatively stable during pre-impact, there were few buildings in the communities to house the rapidly increasing number of oil and gas related companies. Consequently, construction rates quickly increased. As oil and gas activities increased, more jobs were created in the oil and gas industry, the oil and gas related support services, and the local businesses. Community residents filled many of these jobs, but extra laborers were still needed by the oil and gas companies. The philosophy of oil and gas officials was "if we don't get the oil someone else will." As a result, employment agencies and news media throughout the nation reported that additional workers were needed in these booming Texas oil and gas communities. In response to the reports, individuals from all over the nation came into the study communities. In-migrants included speculators, northerners, transients, drifters, hippies, young people, families, and former community residents.

There were tell-tale signs throughout the study communities that the population was increasing during impact: more traffic, more mobile homes, more mail, more newspapers being circulated, and full motels. Also, the communities' economy boomed with increasing property values, bank deposits, tax valuations, and new businesses such as motels, convenience stores, cafes, and banks. Community residents noticed that their community's economy was chang-

ing because prices for goods and services, tax valuations, and rent increased, and some of their neighbors were becoming rich. Changes were also occurring in the communities' service systems, with growing needs for water and sewer hookups, more water, more housing, more mobile home parks, better roads, more policemen, more post office boxes, and more elementary school classrooms. Overall, sudden and drastic changes occurred in every facet of community life.

As the study communities were changing in response to the oil and gas impact, the bottom fell out of the oil industry, causing the communities to instantly enter post-imapct. At that time, oil and gas activities sharply decreased, causing some oil and gas companies to close, to file bankruptcy, or to leave the communities. Construction came to a halt because commercial buildings and houses quit selling. As a result of the slowdown, the number of jobs declined and many people became unemployed. Some people left the communities, while others stayed in the communities with hopes that the oil and gas activities would pick up in the near future. There were many signs that the communities' population was declining: fewer transients, less traffic, more empty mobile homes, and fewer mobile homes in the trailer parks. Almsot instantly the communities' economies were affected, with fewer sales, more bad debt, more repossessions, and a decreased number of local businesses. A ripple effect was noticed in the communities' physical infrastructures, with less need for water and sewer hookups, mobile home parks, and elementary school classroms. With post-impact, the communities were no longer bustling oil towns, but built-up oil towns with an uncertain future.

Experience With Other Energy Activities

The study communities' only experience with energy activities resulted because of oil and gas activities. This is consistent with the nation's rural oil and gas impact communities because most of them are located in remote areas where a single energy resource is explored, developed, and produced ("Slowdown Affects..." 1982).

Summary

The study communities are similar to other rural energy impact communities in terms of population growth during impact, distance from metropolitan areas, and experiences with a single energy industry. Communities included in the study were slightly different from other rural energy impact communities which

have been studied in terms of population, population changes before impact, and experience with multiple energy impact cycles.

Changes In The Acute Health Care Delivery System

Changes in the acute health care delivery system are discussed by the research questions identified for this study. The research questions ask (1) what changes occurred in the health manpower resources, service capabilities, operational status, physical infrastructures, and health care clients in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle and (2) what major problems occurred in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle.

Changes In Health Manpower Resources

Findings from the survey and interview data indicate that changes did occur in health manpower resources during the energy impact cycle. These changes will be presented in the following categories: the need for health manpower resources, the recruitment of health manpower resources, the number of health manpower resources, the retention of health manpower resources, the practice of health manpower resources, the quality of health manpower resources' practice, and the use of health manpower resources with health manpower shortages.

Need for Health Manpower Resources

The need for additional health manpower resources was a problem throughout the energy impact cycle, but the need was accentuated by impact. During impact, (1) the communities' populations were increasing, (2) the utilization rates of acute health care agencies were increasing, and (3) the number of clients with life threatening conditions was increasing. Specific health manpower needs within the communities during impact included physicians, especially specialists in obstetrics, surgery, and internal medicine; nurses, so that the emergency rooms and obstetrics units could have full-time coverage by registered or licensed vocational nurses; allied health personnel; and emergency medical attendants.

The need for additional health manpower resources during impact has been documented in community assessment studies of potential coal, lignite, oil

shale and oil tar sands communities (Bureau of Land Management and The State of North Dakota 1978; Colorado Health Department 1981; Co-West Associates 1987; Ford 1980; Michigan-Wisonsin Pipeline Company 1974; Michigan-Wisconsin Pipeline Company and American Natural Gas Coal Gasification Company 1975; Murdock, Parks, Leistritz, and Jones 1979; Northern Plains Resource Council 1980; U.S. Department of Energy 1980). Findings from these studies showed that with impact more physicians, specialists such as internists and obstetricians, allied health staff, and emergency medical attendants are needed in rural communities. None of these studies indicated that additional nurses would be needed during impact.

According to the interview participants, additional health manpower resources, especially physician specialists, were needed during post-impact, but this need was not as acute as during impact. It is debatable whether additional health manpower resources were needed, because utilization rates decreased in the acute health care agencies during post-impact. Overall, the need for health manpower resources during post-impact was not acute as it had been during pre-impact because the number of health manpower resources increased during impact.

Recruitment of Health Manpower Resources

During impact, recruitment efforts for health manpower, especially physicians and nurses, were more intense and more successful than during any other stage of the energy impact cycle. In fact, the recruitment efforts exerted during impact were still paying off, especially in physician recruitment, during post-impact.

Before impact, physicians did not want to settle in the rural communities because the communities (1) did not provide an attractive financial base on which to establish a practice, (2) did not offer a variety of clients who were young with unpredictable types of conditions, and (3) did not have adequate facilities for setting up a practice. Once the communities experienced impact, it was much easier to recruit physicians because (1) the communities began active recruitment campaigns, including the construction of office buildings, (2) the physicians were attracted to the communities' growing population and financial base, (3) the physicians were challenged by the variety of clients available in the rural energy impact communities, and (4) the communities needed physicians. Studies on the recruitment of physicians to a

rural community support these findings (Cordes 1978A; Hassinger et al. 1980; Korman and Feldman 1977; Meyer and Radtke 1981; Parker and Sorenson 1979). With post-impact, physicians continued to establish practices in the study communities. However, the communities' leaders were not actively seeking additional physicians because the communities' populations had declined.

The successful recruitment of registered nurses and licensed vocational nurses during impact resulted because (1) community leaders initiated fund drives for sponsoring local individuals to nursing school, (2) ads for nurses were placed in regional papers, (3) hospital administrators recruited nurses in Canada, and (4) nurses came into the communities with spouses who were employed by the oil and gas industry.

Overall, the successful recruitment efforts for physicians and nurses during impact resulted in the communities' having more physicians and nurses during both impact and post-impact than they had during pre-impact.

Number of Health Manpower Resources

The overall number of health manpower resources increased during both impact and post-impact. The largest increase occurred during impact, with increases noted in the emergency medical services, the health care provider offices, and the hospitals.

In the emergency medical services, the number of emergency medical service attendants increased. Also, an increased number of emergency medical service attendants became certified as emergency care attendants and emergency medical technicians so that they could better meet the life support needs in the growing communities.

During impact, the largest overall increase in the number of health manpower resources occurred in the health care provider offices. The primary cause for this increase was that more physicians, especially general and family practice physicians, set up practices in the study communities. Other studies also indicate that general or family practice physicians are more likely than other specialists to locate in a rural community (Geyman 1980; Nixon 1981; Rushmer 1980). As these physicians set up practices, an increasing number of registered nurses, licensed vocational nurses, nursing assistants, and allied health staff for laboratory, medical records, and radiology were employed in the health care provider offices.

In the hospitals, there were increasing numbers of physicians, registered nurses, licensed vocational nurses, and nursing assistants employed during impact. There were also more allied health staff employed in medical records, laboratory, pharmacy, and respiratory therapy, and more contract services providing dietary, medical records, physical therapy, and radiology services.

When the communities experienced impact, several factors accounted for the increased number of health manpower resources: (1) more health manpower resources were needed, (2) health manpower resources came into the communities with spouses employed in the oil and gas industry, (3) health manpower resources were attracted to the communies because they heard via the media about the "boomtown atmosphere" of the communities, and (4) officials in the study communities began active recruitment campaigns, especially for physicians and nurses. The overall number of health manpower resources changed during post-impact, with increases occurring in the health care provider offices and the hospitals and decreases occurring in the emergency medical services. In the emergency medical services, the overall number of attendants declined to the pre-impact level, but the number of emergency medical service attendants classified as emergency medical technicians continued to rise. The emergency medical services were being upgraded because organizational changes had occurred since impact and because the directors were attempting to correct the deficiencies that had occurred during impact.

In the health care provider offices, only the number of allied health staff in the laboratory increased during post-impact. In some of the health care provider offices, more laboratory work was being done on-site, while in others laboratory work was no longer being done on-site, but analyzed at the local hospitals. Otherwise, reductions occurred during post-impact in the numbers of registered nurses, licensed vocational nurses, and nursing assistants employed in the health care provider offices.

During post-impact, the largest increase in health manpower resources occurred in the hospitals. There were increases in the numbers of registered and licensed vocational nurses and in the number of physicians, especially consulting physicians for cardiology, obstetrics/gynecology, pathology, pediatrics, and surgery. Although the hospitals' overall number of health manpower resources increased, there were also some reductions in health manpower. The decreases in the number of health manpower resources employed in the hospital are noteworthy: nursing assistants were laid off so that registered and

licensed vocational nurses could be retained on staff; allied health professionals in pharmacy were replaced by contract services; contract services for dietary, physical therapy, respiratory therapy, and radiology were replaced by allied health professionals; and some contract services were eliminated and no replacement personnel hired.

During post-impact, the number of health manpower resources decreased because (1) the utilization of the acute health care agencies decreased from impact levels, (2) the agencies' cash flow declined, (3) some of the health manpower resources left with oil and gas employed spouses and were not replaced, (4) expensive health manpower resources were replaced with health manpower resources that could provide services at a reduced cost, and (5) recruitment campaigns were less vigorous. There were also some increases in the number of health manpower resources during post-impact because the agencies (1) were upgrading their licensed staff, (2) were bringing in physician specialists, (3) were expanding their service capabilities because of specialists in the community, and (4) needed more staff to conduct community outreach programs as an incentive for the community residents to use the acute health care agencies.

Overall, the number of health manpower resources in the communities was greater during post-impact than pre-impact for all the agencies except the emergency medical services. In the emergency medical services the overall number of attendants declined from the impact level, but the number of better trained attendants increased. In the health care provider offices and the hospitals, there were more physicians including specialists, registered nurses, licensed vocational nurses, and allied health staff and contract services for dietary, medical records, laboratory, pharmacy, physical therapy, and radiology during post-impact as compared to pre-impact.

Retention of Health Manpower Resources

The retention of health manpower resources was a major problem in the study communities during every stage of the energy impact cycle. Especially during impact and post-impact, newly established physicians encountered territoriality problems with the physicians who had been practicing in the community before impact. Established physicians feared they would lose clients to the new physicians. Consequently, new physicians often established

their caseloads primarily with new community residents in hopes that these residents would choose to remain in the community.

During impact and post-impact it was also difficult to retain other health workers, especially nurses, because (1) their spouses traveled with the highly mobile oil and gas industry, (2) they were lured away by high paying oil and gas field jobs, (3) they had heavy workloads and long working hours during impact, and (4) they became dissatisfied with the quality of care provided by their agency.

In spite of the retention problem, more physicians, nurses, and allied health staff were in the communities during post-impact than pre-impact. After impact was over the number of emergency medical attendants dropped back to pre-impact levels because (1) attendants did not keep up their certification, (2) certification classes were not available, and (3) the utilization of emergency medical services declined.

Practice of Health Manpower Resources

The practice of the health manpower resources drastically changed during impact and again during post-impact. With impact, the workloads of health manpower resources were heavier and their work hours were longer because (1) the agencies had increased utilization rates, (2) there were an inadequate number of health manpower resources, and (3) more clients had serious conditions. In contrast, the health manpower resources had lighter workloads and shorter work hours during post-impact because (1) the agencies had decreased utilization rates, (2) there was an abundance of health manpower resources, and (3) fewer clients had serious conditions.

A comparison between pre-impact and post-impact shows that during post-impact the workloads were heavier in the emergency medical services and in the out-patient areas of the hospital, but lighter in the health care provider offices and hospital in-patient areas.

Quality of Health Manpower Resources' Practice

According to community residents and agency representatives, the quality of the health manpower resources' practice improved during impact, but did not continue to improve during post-impact. The quality improved during impact because (1) the physicians were more interested in their patients and (2) the new health manpower resources were committed to being successful and improving

the quality of health care available in the communities. During post-impact the quality of the health manpower resources' practice remained at impact levels because (1) few new health manpower resources were entering the communities and (2) the attitude of clients toward the community and its health care delivery system was less positive.

Use of Health Manpower Resources With Health Manpower Shortages

During impact, shortages for nurses and allied health staff existed in the hospitals. In an attempt to alleviate these health manpower shortages, (1) allied health staff were cross-trained to cover multiple areas such as laboratory and radiology, (2) staff members such as licensed vocational nurses were hired to take the place of registered nurses, (3) registered nurses were brought into the local hospitals through contract companies such as Upjohn, Flight Nurses, and Alpha, and (4) nurses from Canada were brought in on one-year contracts.

During post-impact, as compared with pre-impact, the cross-trained staff were still employed at the hospitals in their dual capacities, there was no longer a shortage of licensed vocational nurses and registered nurses, the contract nurse services were no longer being used, and some of the Canadian nurses exceeded the terms specified by their initial contracts by continuing to work in the hospitals.

Changes In The Service Capabilities

Changes occurred in the service capabilities of the acute health care delivery system during the energy impact cycle. These changes are discussed by equipment, programs, new services, availability of services, and quality of services.

Equipment

Throughout the energy impact cycle, the use of old equipment was a common problem in the emergency medical services and in the hospitals. According to Roemer (1978), this is a typical problem in rural acute health care agencies.

The major equipment changes began during impact and continued into post-impact. In the emergency medical services, resuscitation equipment was upgraded and communication equipment was expanded so that the emergency medical services could communicate with local and regional hospitals. Also, the in-

creased use of the ambulances during impact caused them to be replaced much sooner than they would have been without impact. In the hospitals, the following kinds of new equipment were purchased: diagnostic laboratory machines, medicine carts, isolettes, cardiac monitors, portable X ray machines, and burn transfer equipment.

The reasons that equipment was added during impact and post-impact included (1) new physicians wanted equipment that would allow them to provide specialized types of services or generally upgrade the acute health care delivery services in the communities, (2) more clients had acute health care conditions, (3) more clients were using the emergency medical services and the hospitals, and (4) some of the emergency medical services experienced administrative reorganizations, thus bringing in directors who promoted the upgrading of services. As a result of new equipment being added in the emergency medical services and the hospitals during impact and post-impact, more specialized equipment was available in the communities than during pre-impact.

Programs

The educational and community service programs sponsored by the emergency medical services and the hospitals changed during the energy impact cycle. During pre-impact, continuing education classes for employees were offered in the hospitals. With impact, classes were offered by the emergency medical services so that attendants could upgrade their certification levels and by the hospitals so that the community residents would become acquainted with services offered in the local hospitals. These classes continued with post-impact so that more community residents would use the local acute health care agencies. During post-impact, more continuing education courses were offered to hospital employees so that they would become acquainted with the new equipment purchased for the hospitals.

Other programs such as a hospital auxiliary and a candy striper service were begun during impact and continued into post-impact. These programs were initiated so that community residents would become more aware of the local hospitals' services and thereby promote community support for the local hospitals. Many more programs were available to community residents during post-impact than had been available during pre-impact.

New Services

New services were added during impact and post-impact in one of the emergency medical services and in the hospitals. During impact, an emergency medical service was initiated in the county of one study community to help cope with the large population increases in the county. Changes occurred in the hospitals during impact, with the addition of a pharmacy and a continuing education department, and during post-impact with the addition of an intensive care unit.

These changes occurred because (1) the utilization rates of the emergency medical services and the hospital increased during impact, (2) agency representatives wanted to increase local support for the hospitals, and (3) the new physicians coming into the communities wanted to expand service capabilities in the hospitals. The new services that were initiated during impact and post-impact were an expansion of services available during pre-impact.

Availability of Services

Interview participants noticed a change in the availability of acute health care services during impact and post-impact. Officials from the emergency medical services stated that during impact it was sometimes difficult to find the sites of oil or gas related accidents. This problem occurred because (1) in some communities the only communication between officials from the emergency medical services and the oil and gas industries occurred when there was an accident, (2) oil and gas sites were often located in remote areas, many miles from the communities, and (3) during impact there was a dramatic increase in the level of oil activity over pre-impact levels.

During impact, clients had difficulty scheduling appointments in the health care provider offices. Once these clients arranged an appointment and arrived at the health care provider offices, they had long waits for service. This change in availability of services during impact occurred because the utilization rate of health care provider offices increased from pre-impact levels. In contrast, clients had no difficulty securing an appointment with a physician and had short waits for service during post-impact because the utilization rate of health care provider offices decreased. In the hospitals' emergency rooms, clients had difficulty getting prompt medical attention during impact. This occurred because (1) more clients used the emergency room for both major and minor conditions, (2) more clients had life threatening

conditions, (3) there were shortages of registered and licensed vocational nurses to staff the emergency room, and (4) most of the emergency rooms did not have either in-house or full-time physician coverage, but depended on community physicians to respond to emergency room calls at their convenience. The availability of acute health care services was the same during post-impact as it had been during pre-impact.

Quality of Services

The quality of acute health care services was perceived by many interview participants to have greatly improved during both impact and post-impact, but especially during impact. This improvement in the quality of services occurred because (1) officials in some of the acute health care agencies had planned for change, (2) many of the emergency medical service attendants had upgraded their certification levels, (3) communication capabilities between the local emergency medical services and regional medical centers was improved, (4) in-coming physicians were interested in upgrading the quality of acute health care in the communities, (5) there were more physician specialists in the communities, (6) new equipment was purchased for the acute health care agencies, (7) there were more health manpower resources in the communities, (8) community residents were more aware of local services, (9) there were more community outreach programs, and (1) administrative changes occurred in several of the acute health care agencies.

Even though the quality of services during impact and post-impact was much improved from pre-impact levels, some interview participants stated that the quality of acute health care services could have been improved during post-impact.

Changes In Operational Status

Findings indicate that changes occurred in the operational status during the energy impact cycle. These changes will be presented in the following categories: cash flow, gross income used for overhead, finances collected from health care clients, costs for health care, donations to acute health care agencies, and the utilization of acute health care agencies.

Cash Flow

The cash flow into acute health care agencies drastically changed during the energy impact cycle. During impact, the cash flow increased because (1) the utilization of acute health care agencies increased, (2) more of the clients used third party payers to cover health care costs, (3) health care costs increased, (4) the agencies received an increasing amount of subsidies, especially from taxes, and (5) some agencies provided services only with prepayment arrangements.

With post-impact, cash flow declined because (1) the utilization of acute health care agencies was down, (2) fewer people used third party payers to cover health care costs, (3) the collection rate for health care services declined, (4) the amount of subsidies, especially from taxes, declined, and (5) overhead expenses were increased in the hospitals. Overall, the cash flow during post-impact was less for many of the agencies than during pre-impact.

Gross Income Used For Overhead

The amount of gross income used for overhead varied from agency to agency during the energy impact cycle. In comparison to pre-impact, the amount of gross income used for overhead during impact was (1) greater for the emergency medical services because they were being upgraded, (2) greater for the health care provider offices because more employees were being hired in the long-time established offices and new employees and equipment were being added to the newly established offices, and (3) less for the hospitals because the outpatient utilization rate increased and subsidies, especially from taxes, increased.

With post-impact, the amount of gross income used for overhead (1) decreased in the emergency medical services and the health care provider offices because their utilization rates declined and staff were laid off and (2) increased in the hospitals because subsidies continued, but at a decreased rate, and the upgrading of equipment and staff continued. Between pre-impact and post-impact, the amount of gross income used for overhead expenses increased for all of the acute health care agencies.

Finances Collected From Health Care Clients

The collection rates changed for all of the acute health care agencies during the energy impact cycle. Even though payments from third party

reimbursers increased during impact, the collection rate declined for all the acute health care agencies. The collection rate decreased during impact because both the transient people who came into the communities and established community residents did not pay their bills.

During post-impact the collection rate continued to decline for the emergency medical services and the hospitals, but it increased in the health care provider offices. The declining collection rate during post-impact was attributed to (1) more community residents were unemployed and therefore unable to purchase health insurance or to pay health care bills and (2) fewer community residents were covered under third party payers such as workmen's compensation. The increasing collection rate in the health care provider offices during post-impact was due to (1) more efficient billing practices in the newly established health care provider offices and (2) more of the physicians requiring either prepayment or a payment agreement before services were provided. A comparison between pre-impact and post-impact shows that during post-impact the collection rate was higher in the health care provider offices and lower in the emergency medical services and the hospitals.

Costs For Health Care

During impact and post-impact the costs for health care increased from pre-impact levels. Costs for health care increased during impact in all of the agencies, but during post-impact only in the health care provider offices. The reasons that costs increased for health care were that (1) the agencies wanted to increase their revenue, (2) the overhead costs increased in the emergency medical services and the health care provider offices during impact, (3) the collection rate decreased for all of the agencies during impact and again during post-impact except for the health care provider offices, and (4) the utilization of the health care provider offices decreased during post-impact. The costs for services in all of the agencies were more during post-impact than during pre-impact.

Donations To Acute Health Care Agencies

During the energy impact cycle, donations were periodically given to the emergency medical services and the hospitals. With impact and continuing into post-impact, the interest of individual and corporate donors intensified and money was raised to improve the equipment and service capabilities in the

emergency medical services and the hospitals. Donations were given to the emergency medical services and the hospitals because (1) local industries, especially energy companies, wanted to have better health care services available for their employees and (2) community residents wanted to improve the quality of services available at local agencies.

The amount of donations during post-impact greatly exceeded that during pre-impact. Also, the communities' service capabilities were improved during post-impact because the donations were used to upgrade services and equipment in the emergency medical services and the hospitals.

Utilization

Overall, the acute health care agencies experienced increased utilization rates with impact and decreased utilization rates with post-impact. In most cases the utilization rate post-impact was higher than it was with pre-impact. The increased utilization rate occurred with impact because (1) the population increased in the communities, (2) there were more young people in the communities, (3) there was an increased incidence of acute health care conditions, especially from oil and gas related accidents and motor vehicle accidents, (4) there were new physicians in the communities, (5) there was new equipment in the acute health care agencies, (6) the community residents were more aware of services offered in the acute health care agencies, and (7) more community residents used the acute health care agencies unnecessarily.

The decreased utilization rate occurred during post-impact because (1) there were fewer people in the communities, (2) more people in the communities were unemployed and could not pay for health care or insurance, (3) more people were no longer covered under workmen's compensation, (4) the number of acute health care conditions, especially oil and gas related accidents and motor vehicle accidents declined, and (5) residents did not misuse services to the extent they had during impact.

A breakdown by agency shows the changes that occurred in utilization during the energy impact cycle. In the emergency medical services, the utilization patterns changed during impact, with more ambulance runs, more ambulance transfers, more ambulance runs to oil and gas sites, and a greater distance being driven for ambulance runs. The post-impact utilization of emergency medical services showed substantial declines from impact, with fewer ambulance runs, fewer ambulance transfers, fewer ambulance runs to oil and gas sites,

and less distance for ambulance runs. Overall, the utilization rate for the emergency medical services was higher during post-impact than it had been during pre-impact.

In the health care provider offices the utilization rate also increased during impact, but decreased during post-impact. The utilization rate post-impact was still higher than it had been pre-impact.

The hospitals' utilization rates fluctuated by service area. The overall patient admission rate, including the average daily census, consistently declined during the energy impact cycle because (1) more of the clients were transferred out of the communities and (2) physicians prescribed out-patient treatments in lieu of in-patient treatment so they could better use their time. Even though the overall number of patient admissions was declining during impact, increases were noted in the number of patients admitted to obstetrics, pediatrics, the intensive care units, and the emergency rooms. In addition, increases also occurred during impact in the number of deliveries, surgeries, and in-patient and out-patient allied health procedures done at the hospitals.

With post-impact, admissions to several hospital service areas including obstetrics, pediatrics, medical-surgical units, and emergency rooms paralleled the declining overall patient admission rate and the average daily census. However, increases occurred during post-impact in the hospitals' average occupancy rate, the number of patients admitted to the intensive care units, and the number of deliveries, surgeries, and in-patient and out-patient allied health procedures done at the hospitals. These increases were unusual during a time of declining overall utilization, but occurred because (1) some of the young people continued to stay in the communities and wait for the oil and gas activity to pick up again, (2) it was less expensive to have surgery as an out-patient, so the number of out-patient surgeries increased, (3) some of the physicians discontinued doing laboratory and radiology procedures in their offices and sent the work to the hospitals instead, (4) new physicians were ordering more procedures to be done for health care clients, and (5) the intensive care units had been initiated or expanded and new physicians, especially specialists, were using the intensive care units to treat more clients with life threatening conditions.

Hospital utilization rates which were higher during post-impact than during pre-impact included (1) admissions to obstetrics, pediatrics, and inten-

sive care units, and (2) the numbers of deliveries, surgeries, emergency room visits, and in-patient and out-patient allied health procedures.

Several studies about impact communities have findings about the utilization of emergency medical services and hospitals that are similar to the findings of this study. For instance, the utilization rate of the emergency medical services substantially increased during construction of the Alaskan oil pipeline (Dixon 1978). Utilization rates for emergency room visits, out-patient procedures, surgeries, and deliveries increased during impact in a North Dakota coal community (Halstead and Leistritz 1983) and in a Texas lignite community (Burke 1976).

Some of the findings of this study conflict with findings of the previously mentioned studies on energy impact communities (Burke 1976; Dixon 1978; Halstead and Leistritz 1983). In this study, the hospitals' overall patient admission rate and the occupancy rate declined during impact, whereas the previously mentioned studies indicated that the overall patient admission rate and the occupancy rate substantially increased during impact. In general, the differences between this study's findings and those of the other studies could have occurred because (1) the communities experienced impact because of either coal or lignite mining development or pipeline construction rather than from oil and gas activities, (2) impacts resulting from coal and lignite mining development and pipeline construction are usually planned before they occur, as contrasted with oil and gas impact which occur with little warning, (3) more of the workers in the coal and lignite impact communities were married (Leholm, Leistritz and Wieland 1976; Wieland, Leistritz and Murdock 1977 and 1979) as contrasted with workers in oil and gas impact communities (Chase 1983), and (3) more of the workers in the coal and lignite impact communities were from the local communities (Murdock, Leistritz, and Schriner 1982; Wieland, Leistritz, and Murdock 1979) as contrasted with oil and gas workers, who are often transient (Chase and Leistritz 1982; Roosevelt-Custer Regional Council 1981; Shontz 1980).

Changes In Physical Infrastructures

Findings from this study indicate that changes occurred in physical infrastructures during the energy impact cycle. These changes are discussed by the hospitals' bed capacity and building projects involving the physical infrastructures.

The Hospitals' Bed Capacity

Several changes were made in the hospitals' bed capacity during the energy impact cycle. Since there were an increasing number of admissions to pediatric units and a decreasing number of admissions to medical/surgical units during impact, some of the medical/surgical beds were designated as pediatric beds.

The greatest change in the hospitals' bed capacity occurred during post-impact, when the bed capacity was decreased in all of the patient areas except for obstetrics. This occurred because patient admissions rates were decreasing. Overall, the bed capacity for all hospital areas with the exception of obstetrics was less during post-impact than it had been during pre-impact.

Building Projects Involving The Physical Infrastructures

Some building projects occurred in the acute health care agencies during every stage of the energy impact cycle. In an attempt to upgrade the emergency medical services, new office and garage space was built during post-impact. Building projects for health care provider offices occurred during pre-impact and impact as an incentive to recruit physicians into the communities. The hospitals' major building projects occurred during impact and post-impact so that (1) out-patient areas could accommodate the increased utilization rates and (2) patient areas could be built to accommodate clients with acute health care conditions. As a result of changes made in the physical infrastructures during impact and post-impact, the physical infrastructures were enlarged and upgraded over what they had been during pre-impact.

Changes In Health Care Clients

Health care clients changed during the energy impact cycle. These changes are discussed by characteristics of health care clients, use of acute health care delivery services by health care clients, and the health status of health care clients.

Characteristics of Health Care Clients

The characteristics of health care clients changed during the energy impact cycle. During impact, an increased percentage of the clientele was comprised of new community residents. By age, there were more pediatric and

young adult clients. The change in composition of clients occurred because (1) the population increased in the communities and (2) more young people came into the communities looking for oil and gas related employment.

During post-impact, the characteristics of the health care clients changed to fewer new community residents and pediatric clients and more established community residents. This occurred because (1) the communities' population declined and (2) more of the established local residents patronized new physicians and thus the local acute health care delivery system. During post-impact, there were more young community residents, new community residents, and established community residents who used the local acute health care delivery agencies than there had been during pre-impact.

Use of Local Acute Health Care Agencies

The use of the local acute health care agencies, especially the health care provider offices and the hospitals, by community residents continued to change during the energy impact cycle. More community residents used the local acute health care agencies during impact than during pre-impact or post-impact. Even though more community residents used the local agencies during impact, some community residents claimed they would use the local services only for an emergency. The use of acute health care agencies by community residents was greater during post-impact than it had been during pre-impact because (1) they patronized the new physicians, (2) it was time efficient to use local services, and (3) they believed the quality of acute health services had improved. Reasons cited by interview participants for not using the local agencies during any stage of the energy impact cycle were that (1) the agencies were not up to date on techniques, (2) the agencies could not provide specialized care, (3) the quality of care was poor, (4) they were unsure if confidentiality would be maintained by the physician and staff, and (5) their family physician was in another community.

Several studies support these findings, saying that community residents do not support local health care services because (1) they lack confidence in the local acute health care agencies, (2) they lack confidence in local health care providers, or (3) they have had a negative experience with the local acute health care delivery system (Aday and Anderson 1975; Bureau of Reclamation 1974; Kane 1975; Murrin 1982; Mustian 1980). This trend of general dissatisfaction with the local acute health care delivery services was

also documented in coal impact communities (Bickert 1974; Longbrake and Geyler 1979). Community residents in Wyoming and Colorado coal impact communities said that their medical services (1) were greatly in need of improvement and (2) caused them the greatest dissatisfaction of any service in their communities.

During impact it was common for health care clients to seek acute health care services unnecessarily. This occurred because (1) new community residents did not have regular physicians, (2) residents could not get immediate appointments with health care provider offices, (3) community residents had more money to spend on health care, (4) more community residents were covered by third party payers, and (5) new community residents were away from family support systems. Once impact was over, clients did not misuse acute health care services to the extent they had during impact because (1) many of the new community residents left the communities, (2) the number of oil and gas employees declined, (3) it was easier to get an appointments with physicians, (4) community residents did not have as much money, and (5) fewer community residents were covered by third party payers.

Health Status of Health Care Clients

The health status of health care clients changed with impact and again with post-impact. During impact there were more health care clients in all of the acute health care agencies who required either general or emergency care. More of the clients who required emergency care during impact had conditions that were life threatening, such as poisonous inhalations, burns, head injuries, traumatic injuries, fractures, heart attacks, heat stroke, and emotional problems. Some of these clients came in because of the increased number of motor vehicle accidents, motorcycle accidents, oil and gas related accidents, and conditions resulting from physical abuse, drug abuse, or alcohol abuse. The increased incidence of these conditions during impact was because (1) the communities' population had increased, (2) there were more transients in the communities, (3) there were more oil and gas activities in the communities, (4) many of the individuals who worked with the oil and gas industry were prone to accidents because they were inexperienced, fatigued from working multiple shifts, careless, or under the influence of drugs and/or alcohol, and (5) many of the new community residents were from the north and therefore not accustomed to the climate in Texas.

During post-impact the health status of health care clients varied from agency to agency. In the emergency medical services there were fewer clients who required basic and advanced life support services, but more clients who required basic care. Fewer clients in the health care provider offices required either routine or emergency care. In the hospitals, fewer clients came in because of motor vehicle or motorcycle accidents, oil and gas related accidents, drug abuse, alcohol abuse, or physical abuse, but there were more clients admitted with burns, fractures, and life threatening conditions. The changing health status of clients during post-impact occurred because (1) the communities' population declined, (2) fewer individuals were employed in oil and gas related industries, and (3) more individuals were unemployed in the communities.

A comparison between pre-impact and post-impact shows that during post-impact (1) more clients in the emergency medical services required basic care, basic life support and advanced life support, (2) more clients in the health care provider offices required routine care, but fewer clients required emergency care, (3) more clients in the hospitals were admitted to the emergency room with life threatening conditions, (4) more clients in the hospitals were admitted with burns and fractures, and (5) more clients with oil and gas related injuries were treated in the emergency medical services, but fewer clients with oil and gas related conditions were treated in the health care provider offices.

Major Problems In The Acute Health Care Delivery Systems

Several major problems affected the delivery of acute health care services during the energy impact cycle. These problems will be discussed by health manpower resources, service capabilities, operational status, and health care clients.

Health Manpower Resources

A critical shortage of physicians, nurses, allied health staff, and emergency medical attendants resulted during impact because (1) the communities' populations were rapidly increasing, (2) the acute health care utilization rate was increasing, (3) the number of health care clients with life threatening conditions was increasing, and (4) the communities had been relatively unsuccessful in recruiting health manpower resources, especially physicians

and nurses, during pre-impact. As a result of this urgent need for more health manpower resources, the communities and the acute health care agencies (1) began active recruitment campaigns, (2) built health care provider office space to attract physicians, (3) contracted with nurse contract companies to provide nursing staff for the hospitals (4) initiated fund drives for sponsoring community residents to nursing school, (5) cross-trained allied health staff so that they could cover multiple allied health areas, and (6) began community outreach classes on emergency medical services so that community residents could become emergency medical attendants.

The efforts to alleviate shortages of health manpower resources during impact were quite successful, but the post-impact occurred. With post-impact, the utilization rates decreased, resulting in an overabundance of health manpower resources. As a result, the need for health manpower resources changed from a shortage of health manpower resources during impact to a surplus of health manpower resources during post-impact.

Another problem with health manpower resources was in-fighting between new and established physicians. Even though established physicians were treating up to seventy-five clients per day during impact, some of them were concerned that the new physicians would take their clients. The controversy was especially intense over emergency room clients. To cope with the problem in the emergency room, hospital administrators (1) contracted with emergency room physicians to provide care for specified time periods, but predominantly during the weekends when utilization of the emergency room was high and (2) worked with physicians to develop guidelines on emergency room coverage.

Service Capabilities

During impact acute health care services were less available to community residents than they had been during pre-impact. The declining availability of services occurred because (1) the communities' population increased, (2) utilization of the acute health care agencies increased, (3) there were more health care clients that had life threatening conditions, (4) the emergency medical services made an increased number of runs to remote sites in their service areas, and (5) the emergency rooms were used unnecessarily by clients who did not have a family physician or who found it was more cost and time efficient to use the emergency room rather than wait in the health care provider offices for acute health care services.

Operational Status

Acute health care agencies were burdened with an increasing number of health care clients who did not pay for services. This occurred during impact because (1) some transients, especially those looking for work in the oil field, did not have money, (2) some of the new community residents did not have a commitment to the communities and the acute health care agencies, and (3) some of the established community residents believed that since they paid taxes, they did not have to pay for acute health care services. The amount of bad debt continued to increase with post-imapct because (1) many community residents were laid off from the oil and gas industry and did not have money to pay for acute health care services or for insurance and (2) fewer community residents were covered under third party payers such as workmen's compensation.

Another problem in the operational status occurred in the utilization rates of the acute health care agencies. During impact the utilization rates suddenly increased when the oil and gas activities and the communities' populations increased. As a result, problems occurred because the agencies did not have enough (1) health manpower resources to care for the increasing number of clients, (2) service capabilities to provide care for an increasing number of clients with life threatening conditions, and (3) cash flow to upgrade services. During post-impact the utilization rates dropped as suddenly as they had increased with impact. The decreased utilization rates caused instant problems for the acute health care agencies because (1) they had expanded their health manpower resources, service capabilities and physical infrastructures and were no longer able to use them at capacity levels and (2) they had financial problems with a decreased cash flow and an increased amount of bad debt.

Health Care Clients

Major problems emerged in the clients' use of the acute health care agencies. New community residents did not stay in the community long enough to become accustomed to the acute health care agencies. Consequently, (1) health manpower resources did not have time to build cooperative relationships with the clients and (2) health manpower resources were often required to provide

emergency care for conditions that could have been better treated with conservative care if the client had sought care earlier.

During impact there was a dramatic increase in the number of clients who needed treatment for life threatening conditions. This presented major problems to the acute health care agencies because they did not have the health manpower resources and service capabilities to provide care for these acute conditions.

Overall, there were more problems in the acute health care agencies during both impact and post-impact than there had been during pre-impact. The problems caused the agencies to expand and upgrade their health manpower resources, service capabilities, and physical infrastructures much sooner than they would have if the communities had remained in the pre-impact stage.

Summary

The changes and problems that occurred in the acute health care delivery system of rural energy impact communities in Texas during the energy impact cycle were discussed in this section. Data from the agency surveys, the interviews with agency representatives, and the interviews with community residents were combined to determine what changes and problems occurred in the health manpower resources, the service capabilities, the operational status, the physical infrastructures, and the health care clients of the acute health care delivery system. It is evident from the data that changes and some major problems occurred during the energy impact cycle.

Summary

A discussion of the study's findings has been presented in this chapter. First, data from the agency surveys, the interviews with agency representatives, and the interviews with community residents were combined to discuss the characteristics of the study communities and the changes that occurred in the study communities during the energy impact cycle. Second, the changes and major problems that occurred in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle were discussed. The changes that occurred in the acute health care delivery system were discussed by the primary study variables.

For health manpower resources, areas discussed were the need for health manpower resources, the recruitment of health manpower resources, the number

of health manpower resources, the retention of health manpower resources, the practice of health manpower resources, the quality of health manpower resources' practice, and the use of health manpower resources with health manpower shortages. Several areas were also discussed for the variable called service capabilities: equipment, programs, new services, availability of services, and quality of services.

Changes were also presented about the operational status as related to cash flow, finances used for overhead, finances collected from health care clients, costs for health care, donations to acute health care agencies, and utilization. Changes in the physical infrastructures were identified by the hospitals' bed capacity and building projects involving the physical infrastructures. Additional discussion was presented on the changes in the health care clients: characteristics of health care clients, use of local acute health care agencies, and the health status of health care clients. Finally, major problems that occurred with the health manpower resources, service capabilities, operational status and health care clients were discussed.

The following chapter, Chapter VI, concludes the study. The chapter will summarize and present conclusions of the study.

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CHAPTER VI: SUMMARY AND CONCLUSIONS

In this chapter, the summary and the conclusions of the study are presented.

Summary Of The Study

This study examined what changes occurred in the acute health care delivery systems of rural oil and gas communities in Texas during the most recent energy impact cycle. Its purpose was to identify what changes occurred in the emergency medical services, the health care provider offices, and the hospitals during the pre-impact, impact, and post-impact stages of the energy impact cycle. Specifically, the study was designed to answer the following questions:

1. What changes occurred in health manpower resources during the energy impact cycle?
2. What changes occurred in service capabilities during the energy impact cycle?
3. What changes occurred in the operational status during the energy impact cycle?
4. What changes occurred in the physical infrastructures during the energy impact cycle?
5. What changes occurred in health care clients during the energy impact cycle?
6. What major problems were encountered in the acute health care delivery systems during the energy impact cycle?

The Energy Impact Scenario Model was used to set the stage for the study. The scenario surrounding the energy impact cycle was that (1) since the early seventies, several international, national, and local forces have influenced the extent to which energy activities occurred in the nation's oil and gas fields, (2) the intensity of energy activities in the local oil and gas fields determined what stage of the energy impact cycle the rural host community was experiencing, and (3) with each stage of the energy impact cycle, changes occurred in the rural host community's industrial, employment, population, and economic levels and in its public service, educational, and health care systems.

Literature on the energy impact scenario revealed that most of these studies involved coal impact communities rather than oil and gas communities. Also, most of the studies examined rural energy impact communities located in the western and north central United States rather than in Texas. Nearly all of these studies focused on changes in rural energy impact communities during the impact stage of the energy impact cycle, but not on either pre- or post-impact stages of the energy impact cycle or the entire energy impact cycle.

This study sought to extend the database presented in the literature review of the energy impact scenario by (1) exploring what changes occurred in the acute health care delivery systems and (2) identifying the changes that occurred not only during impact, but during the entire energy impact cycle. It deviated from other studies in that (1) it focused on oil and gas impact communities and (2) it concentrated on energy impact communities in Texas.

A retrospective survey design was used to study five rural oil and gas communities in Texas that were selected from a pool of over one hundred rural Texas oil and gas communities. The communities in the pool were nominated by a panel of one hundred experts who lived in Texas and were associated with oil and gas companies and organizations; universities that were engaged in research about oil and gas activities or population levels; community organizations, agencies, and associations; and state agencies involved with oil and gas or population data. Communities that were selected to participate in the study represented five different regions in Texas and met the following criteria: (1) the population in 1970 and 1980 did not exceed twenty thousand, (2) the community was located at least fifty miles from a city of more than fifty thousand population, (3) the community possessed a minimum of one hospital, health care provider office, and emergency medical service, (4) the community experienced the energy impact cycle in the past decade because of oil and gas activities, and (5) the community had not experienced any other type of energy development, i.e., coal, uranium, nuclear power, or hydro-electric power, in the past decade.

Data on changes in the acute health care delivery system were collected by five instruments: a survey instrument for each of the three acute health care agencies, i.e., the emergency medical services, the health care provider offices, and the hospitals; an interview questionnaire for agency representatives; and an interview questionnaire for community residents. These instruments were designed to collect data about changes in the health manpower

resources, service capabilities, operational status, physical infrastructures, and health care clients in the emergency medical services, the health care provider offices, and the hospitals. Development of these instruments was based on the literature review, consultation with rural health and energy impact investigators, visits with agency representatives in rural communities, and the experience of the investigator. Then, the data collection instruments were validated by a panel of nineteen experts and pre-tested in a rural oil and gas impact community in Texas.

Finally, the instruments were used to collect data during three to four day visits in each study community. In these communities, data were collected from (1) surveys of the emergency medical services, the health care provider offices, and the hospitals, (2) interviews with agency representatives in the emergency medical services, the health care provider offices, and the hospitals, and (3) interviews with randomly selected community residents.

For each aspect of data collection, data were gathered for the three one-year periods of time that best corresponded with the community's pre-impact, impact, and post-impact periods. The years of study were determined by (1) oil and gas rig counts, (2) mining employment statistics for oil and gas exploration and drilling, well operations and maintenance, and the operation of natural gas and cycle plants, and (3) individuals in each study community who were associated with oil and gas companies and/or city government.

Upon completion of data collection, data were analyzed using descriptive statistics. The survey data were analyzed by frequencies, means, and percentages of change. The interview data were analyzed by frequency counts.

Findings indicate that changes occurred in the acute health care delivery systems of rural energy impact communities in Texas. A majority of these changes occurred during impact, while some of them were initiated during impact and completed during post-impact. Changes in the health manpower resources included a greater need for health manpower resources during impact, increases in the number of health manpower resources during both impact and post-impact, more successful physician and nurse recruitment efforts during impact and post-impact, more difficulty retaining physicians and nurses during impact and post-impact, more employees laid off in some of the acute health care agencies during post-impact, heavier workloads during impact, and lighter workloads during post-impact. During impact and post-impact the acute health

care agencies' service capabilities changed, with more equipment, more programs, and new services.

Several changes occurred in the acute health care agencies' operational status, including an increased cash flow during impact, a decreased cash flow during post-impact, and a greater share of the agencies' finances used for overhead during impact and post-impact. Other changes in operational status were that the amount of finances collected from health care clients decreased during impact and again with post-impact; health care costs increased during impact; donations increased during impact and post-impact; and, in general, utilization rates increased during impact, but decreased during post-impact.

The physical infrastructures chan[illegible]s in some of the acute health care agencies, with remodeling and expansion projects occurring during impact and post-impact. Substantial changes also occurred during in the health care clients, with more clients having life threatening conditions from oil and gas related accidents, motor vehicle accidents, physical abuse, drug abuse, or alcohol during impact and fewer clients having these conditions during post-impact. During impact, more of the health care clients used the local acute health care services than during pre-impact or post-impact.

The major problems encountered in the acute health care delivery systems during the energy impact cycle were a shortage of health manpower resources during impact, difficulty recruiting licensed nurses during impact, in-fighting among physicians during impact and post-impact, and oil and inadequate equipment during the entire energy impact cycle. Other problems included a decreased availability of acute health care services during impact, an increasing amount of bad debt during impact and again during post-impact, decreasing utilization rates during post-impact, and more health care clients with life threatening conditions during impact and post-impact.

In spite of the problems identified, it was concluded that the acute health care delivery systems were better off during post-impact than they had been during pre-impact. In most cases, the changes that were initiated because of the oil and gas impact and then continued into post-impact greatly improved the acute health care delivery system over what they were and what they could offer during pre-impact.

Conclusions Of The Study

A number of conclusions about what changes occurred in the acute health care delivery systems of rural energy impact communities in Texas during the energy impact cycle can be drawn from the data. Conclusions are presented by the pre-impact, impact and post-impact stages of the energy impact cycle. Changes are categorized by health manpower resources, service capabilities, operational status, physical infrastructures, health care clients, and major problems.

Changes During Pre-Impact

Health Manpower Resources

1. Recruitment efforts for physicians were initiated.

Service Capabilities

1. Replacement equipment was purchased.

Physical Infrastructures

1. Remodeling projects occurred in the acute health agencies.

Health Care Clients

1. More elderly community residents used the local acute health care agencies.

2. Fewer community residents used the local acute health care agencies.

Changes During Impact

Health Manpower Resources

1. There was an increased need for physicians; specialists in obstetrics, surgery, and internal medicine; registered nurses; licensed vocational nurses; allied health staff; and emergency medical attendants.

2. Recruitment efforts for physicians, specialists, registered nurses and licensed vocational nurses were more successful, but retention was more difficult.

3. The number of health manpower resources in the acute health care delivery systems including each of the acute health care agencies increased. (The largest increase occurred during the impact stage of the energy impact cycle.)

4. The number of physicians, specialists, registered nurses, licensed vocational nurses, nursing assistants, and allied health staff employed in the acute health care agencies increased.

5. More general or family practitioners set up practices in the rural energy impact communities.

6. The workloads and the hours of work for health manpower resources increased.

7. The quality of health manpower resources' practice improved.

8. The need for health manpower resources with special skills resulted in more emergency medical service attendants upgrading their professional skills.

Service Capabilities

1. Major purchases for replacement and new types of equipment began.

2. Community health education programs and hospital volunteer programs were initiated.

3. New service areas were added in the acute health care agencies.

4. Services offered by the health care provider offices were less available to community residents.

5. The quality of acute health care services improved. (The major improvement occurred during impact.)

Operational Status

1. The cash flow for all the acute health care agencies increased.

2. The amount of finances used for overhead in the emergency medical services and the health care provider offices increased.

3. The amount of finances collected from health care clients in all of the acute health care agencies decreased.

4. Health care costs increased in all the acute health care agencies.

5. Individual and corporate donations to upgrade service capabilities in the hospitals and the emergency medical services increased.

6. Utilization increased in the emergency medical services; the health care provider offices; and the hospitals' obstetric, pediatric, intensive care, and emergency medical service areas; but decreased in the hospitals' overall patient admission rate and the medical/surgical service areas.

7. The number of deliveries, surgeries, and in- and out-patient procedures in the hospitals increased.

8. The hospitals' average occupancy rate and average daily census decreased.

Physical Infrastructures

1. The hospitals' bed capacity did not change, but medical/surgical beds were redesignated as pediatric beds.

2. Building projects were initiated to upgrade service areas in acute health care agencies.

Health Care Clients

1. More of the health care clients were new community residents, young adults, or children.

2. More community residents used the local acute health care agencies.

3. More health care clients unnecessarily used the acute health care agencies.

4. More health care clients required either general or emergency care in the acute health care agencies.

5. More of the health care clients who required emergency care had conditions that were life threatening such as poisonous inhalations, burns, head injuries, traumatic injuries, fractures, heart attacks, heat stroke, or emotional problems.

6. More of the health care clients were treated because of motor vehicle or motorcycle accidents, oil and gas related accidents, physical abuse, drug abuse, or alcohol abuse.

Major Problems

1. There was a shortage of physicians, specialists, registered nurses, licensed vocational nurses, allied health staff, and emergency medical attendants.

2. It was almost impossible to recruit registered nurses and licensed vocational nurses.

3. In-fighting between new and established physicians over health care clients intensified.

4. The availability of acute health care services diminished.

5. The amount of bad debt increased.

6. Many of the new community residents did not stay in the community long enough to become accustomed to the acute health care agencies.

7. Hospitals did not have the capability to treat the growing number of health care clients who were admitted with life threatening conditions.

Changes During Post-Impact

Several of the changes that occurred during post-impact initially began during impact. For instance, the number of health manpower resources continued to increase in the acute health care delivery systems because the health care provider offices and the hospitals were employing more physicians, specialists, registered nurses, licensed vocational nurses, and allied health staff. In the emergency medical services, an increasing number of emergency medical attendants continued to upgrade their professional skills.

There were also continuing changes in the service capabilities because the acute health care agencies were purchasing more equipment, adding more community health education programs, adding new service areas, and generally improving the quality of their acute health care services. In the operational status of the acute health care agencies the amount of individual and corporate donations to the emergency medical services and the hospitals continued to increase, but so did the amount of bad debt. Also, there was a continuing increase in the number of deliveries, surgeries, and patient procedures done in the hospitals.

The physical infrastructures also continued to improve because of building projects to upgrade service areas in the acute health care agencies. Another continuing trend was that more health care clients needed acute health care services for life threatening conditions.

The following changes occurred only during the post-impact stage of the energy impact cycle:

Health Manpower Resources

1. Fewer general or family practitioners set up practices in the acute health care agencies.

2. The number of health manpower resources associated with the emergency medical services declined from the impact level back to the pre-impact level.

3. Some of the employees, especially nursing assistants and selected allied health staff, in the health care provider offices and the hospitals were laid off.

4. The workloads and the hours of work for health manpower resources decreased.

Service Capabilities

1. Services offered by health care provider offices were more available to community residents.

Operational Status

1. The cash flow for all of the acute health care agencies decreased.

2. The amount of finances used for overhead in the emergency medical services and the health care provider offices increased.

3. The amount of finances collected from health care clients in the emergency medical services and the hospitals decreased.

4. Health care costs decreased in the emergency medical services and the hospitals and increased in the health care provider offices.

5. Utilization decreased in the emergency medical services, the health care provider offices, and in all the hospitals' service areas except for the intensive care units, where utilization increased.

6. The hospitals' average occupancy rate increased, while the average daily census decreased.

Physical Infrastructures

1. The hospitals' overall bed capacity decreased, with decreases occurring in medical/surgical and pediatric beds, but increases occurring in obstetrics beds.

Health Care Clients

1. Fewer of the health care clients were new community residents or children.

2. Fewer community residents used the local acute health care agencies.

3. Fewer health care clients unnecessarily used the acute health care agencies.

4. Fewer health care clients were treated because of motor vehicle or motorcycle accidents, oil and gas related accidents, physical abuse, drug abuse, or alcohol abuse.

5. More of the health care clients who required emergency care in the hospitals had burns or fractures.

6. Fewer health care clients in the health care provider offices required either routine or emergency care.

7. More of the health care clients in the emergency medical services required basic care, but fewer required either basic life support or advanced life support.

Major Problems

1. The utilization rate decreased just when the acute health care delivery systems' health manpower resources, service capabilities, and physical infrastructures were being upgraded.

Changes Between Pre-Impact And Post-Impact

This study has identified that changes occurred in the acute health care delivery systems during pre-impact, impact and post-impact. The following comparison between pre-impact and post-impact shows the extent of these changes in the acute health care delivery systems' health manpower resources, service capabilities, operational status, physical infrastructures, and health care clients.

Health Manpower Resources

1. There were more health manpower resources in the acute health care delivery system.

2. There were more physicians, specialists, registered nurses, licensed vocational nurses, and allied health staff employed in the acute health care agencies.

3. More specialists established practices in the acute health care agencies.

4. The retention of new physicians and nurses was more difficult.

5. The workloads were heavier in the emergency medical services and the hospitals' out-patient service areas and lighter in the health care provider offices and the hospitals' in-patient service areas.

6. More emergency medical service attendants upgraded their professional skills.

Service Capabilities

1. There was more up-to-date equipment in the acute health care agencies.

2. There were more community health education and hospital volunteer programs.

3. There were new service areas in the acute health care agencies.

4. The quality of acute health care services improved.

Operational Status

1. The amount of gross income used for overhead in the acute health care agencies increased.

2. The amount of finances collected from health care clients in the emergency medical services and the hospitals decreased.

3. Health care costs increased in the acute health care agencies.

4. More individual and corporate donations were given to the emergency medical services and the hospitals.

5. Utilization increased in the emergency medical services, the health care provider offices, and the hospitals' obstetric, pediatric, intensive care, and emergency service areas.

6. Utilization decreased in the hospitals' total patient admission rate and the medical/surgical service areas.

7. The hospitals' average occupancy rate and average daily census decreased.

Physical Infrastructures

1. The hospitals' bed capacity decreased.

2. The hospitals had fewer medical/surgical beds and more obstetrics and pediatric beds.

3. Service areas were upgraded.

Health Care Clients

1. More of the community residents used the local acute health care agencies.

2. More of the health care clients in the emergency medical services required basic, basic life support, or advanced life support.

3. More of the health care clients in the health care provider offices required routine care.

4. Fewer of the health care clients in the health care provider offices required emergency care.

5. More of the health care clients were admitted to the emergency rooms with life threatening conditions.

6. More of the health care clients were admitted with burns and fractures.

7. Fewer clients in the health care provider offices were treated with oil and gas related conditions.

In most cases, the changes that occurred during impact and post-impact greatly improved the acute health care delivery systems over what they had been and what they could offer during pre-impact. Accompanying the improvements were a variety of problems, but the acute health care delivery systems were better able to cope with these problems because they had more health manpower resources, greater service capabilities, improved operational status including finances and utilization rates, upgraded and expanded physical infrastructures, and experience with a variety of health care clients.

This excerpt from an interview with a drilling company executive provides a fitting conclusion to this study:

> When we oil people come into a community, just like this community, we are laughed at and we are scorned. People don't want us around. They call us "oil field trash" and stuff like that. I've lived in many an oil boom town, but you know that in every boom community we've been in, the community and especially the community's helping services are better because we've been there.

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